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AN

ILLUSTRATION

OF THE

GENUS CINCHONA;

COMPRISING

DESCRIPTIONS OF ALL THE OFFICINAL PERUVIAN BARKS,
INCLUDING SEVERAL NEW SPECIES.

BARON DE HUMBOLDT'S
ACCOUNT OF THE CINCHONA FORESTS OF SOUTH AMERICA:

AND

LAUBERT'S MEMOIR
ON THE DIFFERENT SPECIES OF QUINQUINA.

TO WHICH ARE ADDED,

SEVERAL DISSERTATIONS OF DON HIPPOLITO RUIZ,
ON VARIOUS MEDICINAL PLANTS OF SOUTH AMERICA.

WITH SEVERAL PLATES.

AND A SHORT ACCOUNT OF

THE SPIKENARD OF THE ANCIENTS,
WITH A PLATE,

BY AYLMER BOURKE LAMBERT, ESQ. F.R.S. A.S. & G.S.
VICE-PRESIDENT OF THE LINNÆAN SOCIETY, AND MEMBER OF THE ROYAL ACADEMY
OF SCIENCES OF MADRID, &c. &c. &c.
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TO

THE CELEBRATED

BARON DE HUMBOLDT,

THE MOST SCIENTIFIC TRAVELLER THIS OR ANY OTHER AGE HAS PRODUCED,

WHO, AS SUCH,

HAS DONE MORE FOR THE PROMOTION OF HUMAN KNOWLEDGE THAN ANY
THAT HAS PRECEDED HIM,

AND

WHOSE NAME WILL REMAIN ONE OF THE BRIGHTEST IN THE ANNALS OF SCIENCE
TILL THE END OF TIME,

THIS WORK

IS INSCRIBED,

WITH THE GREATEST ESTEEM AND RESPECT,

BY

AYLMER BOURKE LAMBERT.

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Memoir on the different species of *Quinquina*. By M. Laubert, Chief Physician to the Spanish army. *Translated from the French*. . . . . *Page* 60

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An account of the *Spikenard* of the Ancients. By A. B. Lambert, Esq. &c. &c. . . . . *Page* 177

PREFACE.

THE great additions made to the genus *Cinchona* since the publication of the author's former account,[*] by the celebrated authors of the *Flora Peruviana*, Don Hippolito Ruiz and Don Jose Pavon, and by the illustrious travellers Humboldt and Bonpland, have induced him to give the following Illustration, which may be either considered as supplementary or as forming a distinct work. He has entirely confined himself to the botanical definitions of the species, and hopes he has been successful, in many instances, in giving more correct diagnoses of the species than has hitherto been done. The very valuable memoirs of Humboldt and Laubert (of which he has here for the first time given translations) will afford every other information relating to their history, and the various qualities of their barks. The Dissertations of Don Hippolito Ruiz on various plants of South America, esteemed for their medicinal virtues, are almost wholly unknown in this country. They are highly deserving attention, as they contain much valuable and instructive information, not only to medical men but to the general reader. Many orthographical errors have, he fears, unavoidably crept into the translations of these Memoirs; but these the candid and liberal-minded reader will rather be inclined to pardon than condemn. If he has succeeded in giving the meaning of his authors, his chief wish will be attained.

---

[*] Description of the genus *Cinchona*. London, 1797.

The Author has lately received an extensive *Herbarium*, containing nearly the whole of the plants collected by the celebrated authors of the *Flora Peruviana*, and their pupils, in Peru, Chili, and Mexico; the number of which amounts to five thousand seven hundred species. The specimens are in the highest state of preservation; and with several duplicates of most of the species. It will not, perhaps, prove uninteresting to the botanical reader, to have a general view of the extent of this magnificent collection, he therefore shall subjoin the number of species in some of the natural orders, and also in some of the genera.

Natural Orders.

Cyperoideæ, Junceæ, et Gramineæ	230
Labiatæ	250
Ericinæ et Rhodoraceæ	25
Compositæ	728
Umbelliferæ	48
Cruciferæ	15
Malvaceæ	168
Leguminosæ	500
Orchideæ	150
Filices	208

Genera.

Convolvulus 62. Psychotria 54. Solanum 90. Alchemilla 5. Lobelia 30. Verbena 26. Laurus 38. Buddleja 10. Tournefortia 12. Mimosa 121. Salvia 66. Croton 61. Quercus 19. Urtica 29. Ficus 30. Passiflora and Tacsonia 31. Cleome 11. Bignonia 32. Gentiana 20. Asclepias 22. Cynanchum 27. Melastoma 41. Myrtus 29. Myristica 6. Euphorbia 22. Theophrasta 5. Barnadesia 4. Gnaphalium 19. Aster 54. Eupatorium 79. Senecio 41. Helianthus 30. Stevia 27. Cacalia 37. Werneria 20. Tagetes 15. Verbesina 25. Bidens 20. Melampodium 12. Culcitium 5. Cecropia 11. Acalypha 24. Clusia 21. Aralia et Actinophyllum 15.*

This collection also contains numerous specimens, both in flower and fruit, of all the species of the highly interesting genus *Cinchona*, collected by the above-mentioned celebrated botanists and their pupils. He has, besides, received part of a collection, which was taken in a Spanish prize bound from Lima to Cadiz; part of whose cargo was sold in London, among which was a fine collection of *Cinchonæ*, purchased by Mr. A. T. Thom~~p~~son, of Sloane ~~Square~~ Street, who had the kindness to give him the duplicates. He has been enabled by these means to ascertain satisfactorily all those figured in the *Flora Peruviana*, besides several new species; and in many instances, also, to clear up the many doubts and errors, which have long pervaded this valuable but intricate genus of plants. He has divided the whole into five sections, and given to each of the species specific differential characters. The author has, in several cases, been obliged unwillingly to differ from the opinion of his friend the Baron de Humboldt, regarding the species figured in the *Flora Peruviana*; but the accidental advantage of his being in possession of the specimens from which these figures were taken, and of having others named by M. Bonpland himself, will, he hopes, justify him in doing so. He intends hereafter to give figures of all the species here described. It was a very fortunate circumstance for him, that the celebrated Don Francisco Antonio Zea, whose authority is of such weight in this genus, was residing very lately for a considerable time in this country; and to whom he had shown all his specimens, and who agrees with him in most of the statements he has given. At the end of the specific descriptions, is added a list of the different kinds of Peruvian barks with their names, fine samples of which, amounting to forty-four sorts, he received from his much valued friend Don Jose Pavon.

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* The author daily expects from his friend M. Pavon, specimens of the plant called *Aracacha*, about which so much has been said in our newspapers and periodical works. It is his intention to give a description and figure as soon as they arrive. The letter of M. Pavon relating to this plant is as follows:—"The *Aracacha* I conceive to be a species of *Daucus;* its root I have frequently eaten, the taste resembles that of parsnip. The plant is cultivated by the Indians, who make much use of it. There exists in Peru a small quadruped which the Indians call *Missu*, and which is very fond of the root of the *Aracacha*. They sometimes destroy in one night a whole field that is planted with it. I once possessed one of these animals, which I domesticated from having it young. I decided that it belonged to the genus *Mus*, and the species called *Mus aguti* by Linnæus, and described by M. Valmont de Bomare in his Dictionary of Natural History."

The interesting pamphlet of Don Hippolito Ruiz, on the *Myroxylon Peruiferum*, he has here for the first time presented in the English language, and has added to it a plate, taken from very fine specimens, received from his often mentioned friend Pavon. It may here be interesting for botanists to learn, that the plates are finished of the fourth and fifth unpublished volumes of the

Flora Peruviana, containing in all two hundred and twenty-three figures.

In the last place, he may notice a circumstance, which, although foreign to the present subject, will nevertheless be interesting information to all the lovers of botany in this country. In a letter he lately received from his friend Don Mariano Lagasca, Professor and Director of the Royal Botanic Garden at Madrid, he notices the safe arrival there of the whole collections of the celebrated Don Jose Cœlestino Mutis, of Santa Fe de Bogota, New Granada, comprising six thousand seven hundred and sixty-nine splendid drawings of his intended *Flora Bogotensis*; besides eighty-five boxes containing specimens of plants, gums, woods, fruits, seeds, &c. with many very valuable manuscripts.

Just as this work was printing, appeared in two volumes octavo, *The Correspondence of Linnæus*, edited by Sir James Edward Smith, the learned President of the Linnæan Society, among which are several letters of Mutis, containing many observations on the plants sent by him to Linnæus from South America; but, what is to be lamented, many of his letters never reached Linnæus; mention is made, however, of copies of them being kept by Mutis; and it is to be hoped that when his immense collections, which have arrived at Madrid, shall be examined, these letters may be found and given to the public. I have only to acknowledge my thanks to Mr. D. Don for his kind assistance in this work.

London, June 2, 1821.

ERRATA.

Page 2, near the bottom, read the *C. lucumæfolia* for *cucumæfolia.*

3, read *lucumæfolia* for *cucumæfolia.*

4, near the bottom, read *duplâ* for *dupol.*

6, near the bottom, after *acutis,* expunge *supra,* and after *diffusâ* read *ferrugineo-tomentosâ.*

9, near the bottom, after *C. glandulifera, Fl. Peruviana,* insert a point of interrogation.

12, near the top, after *Kunth,* expunge the point, and instead of *Fl.* read *Pl.*

27, at the end of the note, insert *Edit.*

DIRECTION FOR THE PLATES.

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Myroxylon Peruiferum	97
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Aristolochia Fragrantissima	175
Valeriana Jatamansi	177

SYNOPSIS

SPECIERUM CINCHONÆ GENERIS.

Sect. I.—*Corollis extus sericeo-tomentosis, limbo suprà barbatis.*

1. Condaminea.
2. cordifolia.
3. rotundifolia.
4. ovalifolia.
5. purpurea.
6. pubescens.
7. micrantha.
8. Humboldtii.
9. Pavonii.
10. macrocarpa.

Sect. II.—*Corollis extus pilosis, limbo suprà barbatis.*

11. Mutisii.
12. hirsuta.

Sect. III.—*Corollis extus sericeo-tomentosis, limbo suprà glabris.*

13. magnifolia.
14. caduciflora.
15. oblongifolia.
16. acutifolia.
17. stenocarpa.
18. dichotoma.

Sect. IV.—*Corollis omninò glabris.*

19. grandiflora.
20. acuminata.
21. rosea.

Sect. V.—*Corollis omninò glabris; genitalibus longè exsertis e basi tubi ortis; stigmate capitato integro; seminibus membranâ integerrimâ cinctis.*

22. triflora.

DESCRIPTIONES SPECIERUM.

1. *C. Condaminea,* foliis ovali-lanceolatis acutis utrinque ramulisque denudatis nitidissimis, paniculâ brachiatâ ramosissimâ lævi, dentibus calycinis ovatis acuminatis, laciniis corollæ lineari-lanceolatis, stigmate emarginato, capsulis ovatis costatis.

C. Condaminea. Humb. et Bonp. Plantæ Æquinoct.* 1. 33. *t.* 10. *Humb. in Mag. der Gesell. Naturf. Freunde. Berlin* 1807, *p.* 112. *Nova Gen. et Spec. Plant.* 3. 400. *Cinchona officinalis Linn. Sp. Pl. ed. W.* 2. *p.* 244. *Syst. Veg. ed.* 10. *p.* 929. *Condamine in Mém. de l'Academ. de Paris,* 1738, *p.* 114. *Lam. Ill. t.* 164. *f.* 1. *Vahl Skrivt. af Natur. Selfkab.* 1. *t.* 1. *Lambert. Monog. t.* 1. *C. stupea Pavon Mss. Cascarilla fina de Uritusinga Hispanorum.

***β. lanceolata, foliis lanceolatis utrinque acutis. C. lanceolata Fl. Peruviana* 3. *p.* 1. *t.* 223. *C. lancifolia Mutis, period. de Santa Fe, p.* 465. *ejusd. Fl. Bogot. Mss. Humb. in Mag. der Gesell. Nat. Fr. zu Berlin* 1807, *p.* 116. *Alib. Traité des Fièvres. p.* 374. *J. Pombo Noticias var. sobre las Quinas officin. p.* 56. *C. nitida Fl. Peruviana* 2. *p.* 50. *t.* 191. *C. angustifolia Ruiz et Pavon. Quinol. Suppl. p.* 14. *cum tabula f. a. C. glabra Ruiz Quinol.* 2. *p.* 64. *C. cucumæfolia Pavon Mss. Quina Naranganda Bogotensium. Quinquina Orange. Quina primitiva directamente febrifuga. Mut. Quinol. (fide Humb.) Cascarilla officinal. Ruiz Quinol. p.* 56. *Cascarillo Lampinò Ruiz Quinol.* 2. *p.* 64.**

γ. foliis ovatis utrinque acutis, floribus majoribus.
C. lutea Pavon Mss. *C. colorata ejusd. Mss.*

δ. foliis subrotundis basi rotundatis apice acutiusculis.

Omnes habitant in montibus Loxæ in Regno Quitensi, et aliis regionibus montosis frigidis Peruviæ. β etiam in Regno Novo-granatensi inter Guaduas et Santa Fe de Bogota, ubi legit celeberrimus Mutis.

This species varies extremely in the form of its leaves, so that no specific mark can be derived from their figure alone; I am not inclined to believe even that the varieties I have marked are permanent, but I have thought best to separate them as they appeared among my specimens. Bonpland regarded the scrobiculi on the leaves as a permanent differential character, notwithstanding their being found more or less numerous on the leaves of almost every species of the genus. I have no hesitation in reducing to this species the *C. lanceolata*, *nitida*, *glabra*, and *angustifolia* of Ruiz and Pavon, as proved by the numerous specimens, both in flower and fruit, I have received from the last-mentioned botanist; as also their unpublished *lutea*, *colorata*, *cucumæfolia*, and *stupea*. A great part of these specimens are from the mountainous forests of Loxa, and in all probability collected and sent home by their pupil Don Juan Tafalla. These specimens agree in every respect with the figure in Humboldt and Bonpland's *Plantæ Æquinoctiales*; many of them, which were taken in a Spanish prize, as I have mentioned in the short preface to this work, I submitted to the examination of M. Bonpland while in this country, who considered them as identical with his *C. Condaminea*, and which agrees exactly with those specimens I have more recently received from the celebrated author of the *Flora Peruviana et Chilensis*, Don Jose Pavon. The celebrated Mutis has, and I think too with great propriety, considered his *C. lancifolia* the *Quina Naranganda*, or Quinquina Orange of Santa Fe, as identical with the *quina fina de Uritucinga*, or Humb. and Bonpland's *C. Condaminea*. No description is given of the *C. lancifolia* of Mutis in the *Nova Genera et Species Plantarum* of Humb. Bonpl. and Kunth, and it is probable that they were made acquainted with it only from the drawings of Mutis. The short specific character given in the above work does not distinguish it in the least from their *Condaminea*.

2. *C. cordifolia*, foliis subrotundo-ovatis acutis basi cordatis attenuatisve subtus ramulisque pilosiusculis supra denudatis nitidis, paniculâ brachiatâ diffusâ pubescente, dentibus calycinis latè-rotundatis mucronulatis, stigmate bilobo, capsulis oblongo-ovatis cylindricis ecostatis.

C. cordifolia Mut. Mss. Humb. in Magazin, &c. p. 117. *Rohde Monog. p.* 58. *Humb. Bonpl. et Kunth. Nova Gen. et Spec. Plant.* 3. *p.* 401 (*exclus. Synonymis omnibus Fl. Peruvianæ, nec non Linn. Syst. Nat. Vahl et Lambert.*) *C. sp. nova vulgo palo blanc Pavon Mss. Quina amarilla. Bagotensium.*

Habitat nemora montosa Loxæ in Regno Quitensi Peruvianorum (Pavon) in Regno Novo-granatensi, ubi legit Mutis.

Genitalia inclusa, filamenta plana dilatata antheris linearibus dupol breviora; stigmatis lobis oblongo-ovatis obtusis.

This species is totally different from the *Cinchona purpurea*, *hirsuta*, and *ovata* (*pubescens* Vahl) of *Flora Peruviana*, which Humboldt and Bonpland in their before-mentioned work have given as synonyms of Mutis's plant. The specimens I possess of it have been examined and named by M. Bonpland while in England. From the *C. pubescens* (*C. ovata Fl. Peruv.*) of Vahl, with which it has the greatest affinity, it is distinguished by its shorter petioles, by the broader round teeth of its calyx, by the filaments being twice longer, and lastly, by its capsules being smooth and without ribs.

3. *C. rotundifolia*, foliis subrotundis supra denudatis nitidis subtus ramulisque pilosis, paniculâ brachiatâ pubescente, dentibus calycinis brevissimis mucronulatis, stylo exserto, stigmate bipartito, capsulis linearibus teretibus.

C. rotundifolia, Pavon Mss.

Habitat in nemoribus in Loxa Quitensium Peruviæ. (Pavon.)

Laciniis corollæ ovatis; antheræ filamentis breviores; stigmatis lobis linearibus planis obtusis.

This is a very distinct species, being easily distinguished from all its congeners by its narrow cylindrical capsules, and by the narrow linear divisions of its stigma.

4. *C. ovalifolia*, foliis ovalibus obovatisve supra denudatis nitidis, subtus ad venas pilosis, dentibus calycinis ovatis acutis, antheris filamentis duplò longioribus, stigmate bipartito, capsulis ovalibus apice constrictis.

C. ovalifolia, Humb. et Bonpl. Plantæ Æquinoct. 1. *p.* 65. *t.* 19. *Ejusd. Nov. Gen. et Sp. Plant.* 3. *p.* 403 (*exclus. Synon. Mutisii. Humb. in Magazin, &c. Vahl et Lambert, nec non Rohde Monog.*;) *C. sp. nova Pavon Mss.*

Habitat nemora montosa ad Loxam in Regno Quitensi Peruvianorum (Pavon); in Andibus Peruviæ prope Cuenca (Humb. et Bonpl.).

Paniculâ brachiatâ pubescente; laciniæ corollæ lineares; stigmatis lobis linearibus obtusis.

This plant must not be confounded with the C. *ovalifolia* of Mutis, the *C. macrocarpa* of Vahl, or *Quinquina blanc* of New

Granada, which is totally different. *Vide* the remarks I have given on that species.

5. *C. purpurea*, foliis ovalibus ovatisve acutis basi attenuatis utrinque demum denudatis nitidis, paniculâ corymbosâ pubescente, antheris filamentis brevioribus faucem superantibus, stigmate bilobo incluso, capsulis angustè ovato-oblongis apice attenuatis.

C. purpurea, Fl. Peruviana, 2. *p*. 52. *t*. 193. *C. scrobiculata, Humb. et Bonp. Plantæ Æquin.* 1. *p*. 165. *t*. 47. *Ejusd. Nov. Gen. et Sp. Plant.* 3. *p*. 402. *Cascarilla fina Bracamorensium. Cascarilla morada, Ruiz Quinol. p*. 67. *Cascarilla boba de hogamorado.*

Habitat in Andium montibus imis nemorosis et nocte frigidiusculis passim ad Chinchao, Pati, Muna; Casape, Iscutunam, Casapillo et Chihuamocula tractus (Ruiz et Pavon) in Peruviæ Andibus, juxta urbem Jaen de Bracamoros (Humb. et Bonpl.).

Capsulæ bisulcæ junioribus pubescentibus demum lævibus.

To this species I have, without hesitation, reduced the *C. scrobiculata* of Humboldt and Bonpland. It is distinguished from the preceding species by its more acute, smoother, and shining leaves; by its corymbose panicles; by its filaments being longer than the antheræ, and these surpassing the faux of the corolla; by the capsules, which are ovato-oblong narrowed, and without ribs; and lastly, by the shorter and broader divisions of its stigma.

6. *C. pubescens*, foliis latè ovatis subrotundo-ovatisve acutis supra longè petiolatis basi rotundatis subacutisve, supra denudatis nitidis, subtus ramulisque piloso-tomentosis, paniculâ brachiato-diffusâ ferrugineo-tomentosis, antheris subsessilibus, stigmate bilobo, capsulis ovali-oblongis obsoletè costatis tomentosis.

C. pubescens, Vahl in Act. Havn. 1. *p*. 19. *t*. 2. *Lambert*

Monog. t. 2. *C. ovata, Fl. Peruviana,* 2. *p.* 52. *t.* 195. *Cascarillo palido, Ruiz Quinol. p.* 74. *Vernaculi Cascarillo de Pata de Gallareta.*

Habitat in Andium montibus imis nemorosis calidis versus Pozuzo et Panao (Ruiz et Pavon), et etiam in nemoribus Huanuci Peruvianorum (Pavon Mss.).

Petioli biunciales; dentes calycis brevissimi acuti; laciniæ corollæ ovatæ obtusæ; genitalia inclusa; stylus antheras superans; stigmatis lobis ovatis.

7. *C. micrantha,* foliis latè ovalibus obovatisve supra denudatis nitidis subtus in axillas venarum pilosis, paniculâ confertâ pubescente, antheris filamentis brevioribus vix exsertis, stylo brevissimo, stigmate bilobo, capsulis ellipticis apice attenuatis.

C. micrantha, Fl. Peruviana, 2. *p.* 52. *t.* 194. *vulgò Cascarillo fino.*

Habitat in Andium montibus altis frigidis et nemorosis, versus vicum Sancti Antonii de Playa Grande, ubi observavit Joannes Tafalla (Ruiz et Pavon.).

Corollæ laciniis ovatis; dentes calycis brevissimi acuti; stigmatis lobis ovatis; capsulæ bisulcæ ecostatæ.

This has some affinity with *C. Condaminea*; but its small flowers and elliptical ecostate capsules, together with its very short style and other marks, readily distinguish it.

8. *C. Humboldtiana,* foliis lanceolatis utrinque acutis supra denudatis subtus ramulisque villosis, paniculâ glomeratâ villosâ, dentibus calycinis brevissimis acutis, antheris sessilibus inclusis, stigmate exserto emarginato, capsulis ovatis hirtis glomeratis.

C. villosa, Pavon Mss.

Habitat ad urbem Jaen de Bracamoros, nemora in Regno Quitensi Peruvianorum. (Pavon.)

This is a strongly marked and very distinct species; there is none with which it can be confounded.

9. *C. Pavonii,* foliis orbiculatis cordatisve supra denudatis subtus ramulisque ferrugineo-tomentosis, corymbis ferrugineo-tomentosis, calycibus urceolatis integris absolutè denticulatis, corollæ tubo longissimo, antheris sessilibus, stigmate profundè bipartito, capsulis longissimis teretibus.

C. cava, Pavon Mss. vulgò Canela.

Habitat in memoribus ad Loxam in Regno Quitensi Peruvianorum. Pavon.

Corymbi confertiflori; corollæ magnæ sericeæ, laciniis ovato-oblongis obtusis carnosis; antheræ inclusæ lineares obtusæ subsessiles, apicibus vix faucem superantibus; stylus inclusus; stigmatis lobis linearibus obtusis margine revolutis; capsulæ longitudine et crassitudine digiti.

This species has considerable affinity with the following. The form of its leaves, its deeply bipartite stigma, its very long cylindrical capsules the size of one's finger, however, widely separate it.

10. *C. macrocarpa,* foliis latè ellipticis obtusissimis subtus ramulisque densè scabrè tomentosis, calyce integro, dentibus prominulis, corollæ ampliatæ laciniis lanceolatis apice recurvis, genitalibus inclusis, stigmate emarginato, capsulâ pyriformi tomentosâ.

C. macrocarpa, Vahl in Act. Havn. 1. p. 20. t. 3. (exclusis Synonymis) Lamb. Monog. p. 22. t. 3. C. ovalifolia, Mutis Mss. Humb. in Magazin, etc. p. 118. Rohde Monog. p. 61. non Humb. et Bonpl. Plantæ Æquinoct. nec Nov. Gen. et Sp. Plant. ejusd. Cosmibuena sp. nova, Pavon Mss. vulgò Quina blanca, vel Quinquina blanc de Santa Fe.

Habitat in nemoribus Loxensibus, Huaquilensibus et Cuencensibus (Pavon.); in Regno Novo-granatensi (Mutis.).

Corymbi pauciflori; calyx urceolatus integer; stylus sulcatus.

This belongs to the genus *Cosmibuena* of the *Flora Peruviana*; but, for the want of more distinctive differential generic marks, I have thought best to keep it still united to the genus *Cinchona*. This is certainly the Cinchona *ovalifolia* of Mutis, which, however, must not be confounded with the *C. ovalifolia* of Bonpland, a species totally different: of this Bonpland was well aware in describing his plant in *Plantæ Æquinoctiales*. Professor Kunth more recently, in the *Nova Genera et Species Plantarum*, has been led into an error in considering Mutis's plant the same with that of Bonpland, an opinion which is quite at variance with the figure in *Plantæ Æquinoctiales*, which has not the least resemblance to Mutis's plant, and which Bonpland has there distinctly stated to belong to the genus *Cosmibuena* of the *Flora Peruviana*. The note of Humboldt (with respect to the *C. grandiflora, Flor. Peruv.*) at the end of the description in the *Nova Genera et Species Plantarum*, has no reference to the plant there described, but distinctly to the *ovalifolia* of Mutis. The synonyms, therefore, ought to be expunged altogether, as they belong to the present species.

11. *C. Mutisii*, foliis ovalibus utrinque subacutis supra denudatis nitidis subtus ramulisque valdè pilosis, margine undulatis subrevolutis, paniculâ brachiatâ valdè pilosâ, dentibus calycinis brevissimis mucronulatis, corollæ laciniis ovatis, stigmate emarginato, capsulis ovatis cernuis.

C. microphylla, Mutis Mss. (Auct. Zea.) C. quercifolia, Pavon Mss. C. glandulifera, Fl. Peruviana, p. 1. *t.* 224.

β. foliis ovalibus obtusis basi rotundatis subcordatisve.

C. quercifolia var. crispa, Pavon Mss.

Habitat ad Loxam in Regno Quitensi Peruvianorum. (Pavon.)

Antheræ exsertæ filamentis breviores; stylus inclusus.

My specimens of this truly distinct species I submitted to the examination of my intelligent friend Don Francisco Antonio Zea, who recognised them to be the *Cinchona microphylla*, an unpublished species of Mutis, who gave the Baron de Humboldt a drawing of it when the latter was at Santa Fe. Having never received specimens of the *C. glandulifera* of the *Fl. Peruviana*, I therefore give it as a synonym with considerable doubt.

12. *C. hirsuta*, foliis ovalibus basi acutis ramulisque valdè setoso-pilosis supra venosis demuin denudatis, floribus glomeratis setoso-pilosis, laciniis calycinis lanceolatis acuminatis, stigmate bilobo, capsulis ovatis.

C. hirsuta, Fl. Peruviana, 2. *p*. 51. *t*. 192. *Cascarilla delgado, Ruiz Quinolog. p*. 60.

Habitat in Andium montibus nemorosis, altis et frigidis locis versus Pillao et Acomayo. (Ruiz et Pavon.)

Humboldt and Bonpland, in their often-quoted work, have, on the authority of Zea, referred this species to the C. *cordifolia* of Mutis, with which it has not the least resemblance: this could only be expected from their knowing the plant merely from the figure and description in the *Fl. Peruviana*, without ever seeing specimens of it. Having, therefore, obtained very fine specimens from the author of the *Flora Peruviana*, and which I have shown to Don Zea, he now quite accords with me in considering it a very different species.

13. *C. magnifolia*, foliis latè subrotundo-ovalibus supra denudatis nitidis subtus densè tomentosis, paniculâ brachiato-corymbosâ tomentosâ, dentibus calycinis brevibus acutis, laciniis corollæ lanceolatis, antheris inclusis, stylo exserto, stigmate bipartito, capsulis linearibus teretibus.

C. magnifolia, Fl. Peruviana, 2. *p*. 52. *t*. 196. *(non Humb. et Bonpl.) Cascarillo amarillo, Ruiz Quinolog. p*. 71.

Habitat in Andium nemoribus calidissimis prope torrentes copiosè ad Chinchao, Cuchero et Chacahuassi. (Ruiz et Pavon.)

Laciniis corollæ tubi longitudine; antheræ limbo multò breviores; stigmatis lobis linearibus obtusis margine revolutis.

The celebrated authors of the *Flora Peruviana* have, in that work, confounded this species with that called by the natives *Flor de Azahar*, the *C. oblongifolia* of Mutis, a very different plant, the bark of which had been first sent to Spain by Don Sebastian Joseph Lopez Ruiz, a physician of Santa Fe de Bogota. M. Bonpland has confounded it with his *C. caduciflora*, which he at first described under the name of *C. magnifolia* of the *Flora Peruviana*; but he very properly altered his opinion afterwards in his note to *C. scrobiculata*, *Plantæ Æquinoct*. 1. *p*. 167. The present species differs from Bonpland's plant by the form of its leaves, by the acute teeth of its calyx, by its larger corolla, whose lanceolate laciniæ are equal to the length of the tube; by the anthers being inclosed in the tube; by the style being exserted; and especially by its linear cylindrical capsules.

14. *C. caduciflora*, foliis latè obovatis basi acutis supra denudatis nitidis subtus ad axillas venarum pilosis, paniculâ brachiatâ pubescente, dentibus calycinis ovatis obtusis, laciniis corollæ lineari-oblongis, antheris parùm exsertis, stylo brevissimo, stigmate bipartito, capsulis ovali-oblongis.

C. caduciflora, Bonpl. in Plantæ Æquinoct. 1. *p*. 167. *Humb. Bonpl. et Kunth. Nov. Gen. et Sp. Plant*. 3. *p*. 402. *C. magnifolia, Humb. et Bonpl. Fl. Æquinoct*. 1. *p*. 136. *t*. 39. (*exclus. Synon. Fl. Peruv.*) *Cascarilla bova Peruvianorum*.

Habitat in Peruviæ Andibus juxta urbem Jaen de Bracamoros. (Humb. et Bonpland.)

Corollæ laciniis tubo brevioribus; stigmatis lobis linearibus planis.

15. *C. oblongifolia,* foliis oblongis cordatisve utrinque ramulisque densissimè scabrè pilosis, paniculâ brachiato-corymbosâ scabrè pilosâ, laciniis corollæ pilosæ linearibus, genitalibus inclusis, antheris filamentis triplò longioribus, stigmate bipartito, capsulis ovatis.

C. oblongifolia, Mutis Mss. Humb. in Magazin, etc. p. 118. *Rohde, Monog. p.* 57. *(exclus. Synonym. Fl. Peruv.) Humb. Bonpl. et Kunth. Nova Gen. et Sp. Fl.* 3. *p.* 401. *(exclus. Synonym. Fl. Peruv. et Ruiz Quinalog.) vulgò Quina roga Cinchona vulgò Azahar, Pavon Mss.*

Habitat nemora in montibus Loxæ Peruvianorum (Pavon) prope Maraquita Novo-Granatensium. (Humb. et Bonpland.)

This plant is certainly very distinct from the *C. magnifolia* of *Flora Peruviana.* It is distinguished from it by its leaves being rounded at the base, often cordate, covered on both sides with rough pilose tomentum, sometimes the older leaves, however, become nearly naked above; the corolla is covered on the outside with bristly pilose hairs, while that of *magnifolia* has short pubescence; the laciniæ are also much narrower; the style is inclosed with the stamens in the tube of corolla; the lobes of the stigma are cylindrical, and the capsules are ovate: those of *magnifolia* are linear and cylindrical. All these characters are constant in all the specimens I possess of both species, and I therefore think myself justified in separating them, although I am extremely unwilling to be at variance with so high authority as Humboldt justly is.

16. *C. acutifolia,* foliis lanceolatis acuminatis supra denudatis nitidis ad venas pilosis, laciniis calycis lineari-oblongis obtusis, laciniis corollæ linearibus acutis, genitalibus inclusis, stigmate bipartito, capsula pyriformi hirsutâ basi attenuatâ.

C. acutifolia, Fl. Peruviana, 3. *p.* 1. *t.* 225. *Cascarillo de hoja aguda, Ruiz et Pavon Supplem. Quinolog. p.* 8.

Habitat in Peruviæ Andium nemoribus imis ad Chicoplaya fluvium, Taso dictum. (Ruiz et Pavon.)

Panicula brachiata, densè pilosa; stigmatis lobis linearibus, obtusis.

17. *C. stenocarpa,* foliis lanceolatis utrinque acutis supra denudatis subtus ad venas pilosis; dentibus calycinis ovatis acutis, antheris sessilibus, stylo brevissimo, stigmate emarginato, capsulis linearibus teretibus.

C. sp. nova, Pavon Mss.

Habitat nemora juxta urbem Jaen de Bracamoros in Regno Quitensi Peruvianorum. (Pavon.)

Panicula diffusè ramosissima pubescens; laciniæ corollæ lineares obtusæ.

Facies *C. Condamineæ,* at diversissima.

18. *C. dichotoma,* foliis ellipticis breviter acuminatis utrinque demum denudatis basi acutis; junioribus sericeis, pedunculis terminalibus dichotomis paucifloris, dentibus calycinis brevissimis, capsulis linearibus longissimis teretibus.

C. dichotoma, Fl. Peruviana, 2. *p.* 53. *t.* 197.

Habitat in Andium nemoribus versus Pueblo Nuevo in Chicoplaya tractibus, ubi Joannes Tafalla speciem detexit, et inde exemplaria sicca nobis anno 1797 misit. (Ruiz et Pavon, loc. cit.)

All the specimens of this remarkable species of *Cinchona,* sent by Don Juan Tafalla to the authors of the *Flora Peruviana,* appear to have been fruit-bearing ones only, so that its flowers still remain unknown; and on that account I am doubtful whether it belongs to this section. My specimens agree exactly with the excellent figure in the above work.

19. *C. grandiflora*, foliis obovatis obtusissimis utrinque petiolisque denudatis nitidis, corymbis paucifloris glaberrimis, dentibus calycinis ovatis acutis, corollæ tubo ampliato, antheris sessilibus inclusis, stigmate bilobo, capsulis elongatis teretibus.

Cinchona grandiflora, Fl. Peruviana, 2. *p*. 54. *t*. 198. *Cosmibuena obtusifolia, ejusd. oper*. 3. *p*. 3. *t*. 198.

Habitat in Andium nemoribus calidissimis Peruviæ, affatim ad Pozuzo fluvii margines (Ruiz et Pavon.); etiam ad novum vicum Pueblo Nuevo de S. Antonio de Chicoplaya.

Corollæ laciniis latè ovatis, planis, carnosis; antheræ lineares; stylus exsertus, stigmatis lobis ovatis, obtusis, crassis; capsulæ nudæ.

This is the *Cosmibuena obtusifolia* of the third vol. of *Flora Peruviana*. It is widely different from the *C. macrocarpa* of Vahl, the *C. ovalifolia* of Mutis, with which Humboldt, in his account of the Bark Forests, appears to have confounded it. The flowers are of a brilliant white, the largest of the whole genus, which, together with its green shining leaves, form a striking contrast in its native forests. It delights in the warmest regions of Peru.

20. *C. acuminata*, foliis ovatis brevitèr acuminatis utrinque petiolisque denudatis nitidis, floribus terminalibus subsolitariis, dentibus calycinis oblongo-ovatis obtusiusculis, corollæ tubo longissimo angustato, genitalibus parùm exsertis, stigmate bilobo, capsulis oblongis cylindricis.

Cosmibuena acuminata, Fl. Peruv. et Chilen. 3. *p*. 4. *t*. 226.

Habitat in Peruviæ Andium nemoribus imis, ad Chicoplaya tractus, unde Joannes Tafalla specimina sicca nobis anno 1798 nusit. (Ruiz et Pavon loc. cit.)

Corollæ laciniis latè ovatis; antheræ lineares, sessiles; stigmatis lobis oblongis, crassis, obtusis.

21. *C. rosea*, foliis lanceolato-ovatis utrinque acutis denudatis nitidis, paniculâ confertâ, calycibus integris denticulis obsoletis, laciniis corollæ latè ovatis, filamentis basi barbatis, antheris sphæricis! exsertis, stigmate emarginato incluso, capsulis ovatis bisulcis glabris.

C. rosea, Fl. Peruv. et Chilens. 2. *p.* 54. *t.* 199.

C. Tarantaron, Pavon Mss. Cascarilla Pardo, Ruiz. Quinolog. p. 77.

Habitat in Andium nemoribus imis, copiosè ad Pozuzo et S. Antonii de Playa Grande tractus. (Ruiz et Pavon.)

Notwithstanding the very accurate figure of this plant in the *Flora Peruviana*, Humboldt, on the authority of Zea, has been led to join it with the *Cinchona lancifolia* of Mutis, with which it has not the least affinity, and forms one of the most distinct and strong-marked species of the whole genus. The corolla is quite smooth; its filaments are long, and bearded towards the base: but what is the most striking character of all, is its spherical antheræ, which no other genuine *Cinchona* yet known possesses. My friend Don F. A. Zea, to whom I showed my specimens of it, and who had never before seen any, agrees with me in regarding it as a species widely remote from the *C. lancifolia* of Mutis. The description in *Flora Peruviana* states the laciniæ of the corolla as being hairy at the margin; this circumstance is not evident in the figure, neither can I find the least trace of it in my specimens.

22. *C. triflora*, foliis lanceolatis obtusis utrinque ramulisque glaberrimis nitidis basi attenuatis, corymbis compositis tenuifloris, pedunculis 3-2-floris, dentibus calycinis subulatis, corollæ tubo longissimo filiformi: laciniis angustè linearibus longis dependentibus, capsulis obovatis.

C. triflora, Wright in Edinb. Med. Journ. p. 240.

Habitat in insulâ Jamaicâ, Wright et Wiles.

This belongs to the section of Island *Cinchonæ*, which perhaps ought to form a distinct genus. It is a native of Jamaica, where it was first discovered by the late Dr. Wright of Edinburgh, an indefatigable botanist, who ascertained it to be a distinct species, and afterwards described it in the Edinburgh Medical Journal, under the name of *C. triflora*, from the peduncles being mostly three-flowered. I possess excellent specimens of it both in flower and fruit, which agree in every respect with those I have received from Dr. Wright himself. The *C. floribunda* of Swartz, with which it has the greatest affinity, differs from it by the leaves being ovato-elliptical acuminate, not attenuated at the base; the corymbs of flowers are also much larger and closer; the teeth of the calyx shorter and broader; the tube of the corolla is much shorter and wider; and the capsules oblong cylindrical.

LIST OF BARKS.

1. Cinchona vulgò Azaharito de Loxa.
2. ———— Cascarilla crespilla de Jaen de Loxa.
3. ———— Cascarilla fina de Loxa.
4. ———— Cascarilla de Quiebro de Cuenca de Loxa.
5. ———————— Tarantaron de Loxa:
6. ———————— Puchon de Loxa.
7. ———————— Flor de Azahar.
8. Cinchona rosea del Peru.
9. ———— con hojas rugosas de Loxa.
10. ———— con hojas de Lucuma de Loxa.
11. ———— Quina crespilla de Loxa.
12. ———— Margarita de Loxa.
13. ———— con hojas de Roble de Loxa.
14. ———— laccifera del Peru parecida à la Roxa, de Mutis.
15. ———— Azahar macho de Loxa.
16. ———— Pata de Gallinano, vulgò de Loxa.
17. ———— Provincia, vulgò de Loxa.
18. ———— Azahar hembra, vulgò de Jaen de Loxa.
19. ———— Cascarilla crespilla ahumada de Loxa.
20. ———— Cascarilla colorada de Jaen de Loxa.
21. ———— Cascarilla amarilla de Quito Loxa.
22. ———— Cascarilla crespilla de Latuna de Loxa.
23. ———— Quina parecida à la amarilla de Mutis.
24. ———— Quina crespilla parecida à la buena de Loxa.
25. ———— Quina con hojas un poco vellosas de los Azques de Loxa.

26. Cinchona Cascarilla o Quina de Nagenal de Loxa.
27. ———————— serrana de Huaranda Loxa.
28. ———————— con hojas de Palton de Loxa.
29. ———————— con hojas redondas de Quiebro de Loxa.
30. ———————— bola del Peru.
31. ———— Quina colorada del Rey de Loxa.
32. ———— Quina amarilla fina del Rey de Loxa.
33. ———— Cascarilla chauerguera de Loxa.
34. ———— Quina negra de Loxa.
35. ——————— amarilla de Quito de Loxa.
36. ——————— con hojas de Lambo de Loxa.
37. ——————— estopara de Loxa.
38. ——————— blanca Pato de Gallinaso de Loxa.
39. ———— Cascarilla colorada de los Azques de Loxa.
40. ———————— colorada de Loxa.
41. ———————— amarilla Uritusinga.
42. ———————— crespilla mala de Macos de Loxa.
43. ———————— Provinciana fina de Jaen de Loxa.
44. ———————— amarilla del Rey de Loxa.

ON THE

CINCHONA FORESTS OF SOUTH AMERICA.

BY A. VON HUMBOLDT.

SECTION I.

THE present Essay is written with a view to examine the Cinchona tree as an object of physical or botanical geography. Amongst the numerous writers mentioning the Cinchona, there are none but La Condamine, Ruiz, Pavon, and Zea, who themselves have observed this beneficial tree upon the South American continent. Only the first of these gives a physical description of this plant; the others, as well as Jacquin and Swartz, who saw the Cinchonæ in the West-India Islands, and Vahl and Lambert, who occupied themselves with dried specimens, have merely treated on the natural history and the botanical diagnosis. During my stay of four years in South America, I had occasion to reside a long time in countries where the Cinchona trees are indigenous. M. Bonpland and myself have observed them north and south of the equator, in the kingdom of New Granada, betwixt Honda and Santa Fe de Bogota, in the province of Popayan, in the corregiment of Loxa, on the Amazon river, in the province of Jaen de Bracamoros; and in the northerly part of Peru. During our abode in the house of Don Jose Celestino Mutis, in Santa Fe, the botanical treasures of that great natural philosopher were opened to us. In Spain, also, we were enabled to collect, from the editor of the *Flora Peruviana*, in Guayaquil, (the harbour of Quito on the coast of the South Sea) from M. Tafalla, a pupil of Ruiz, in the little town of Loxa, from Don Vincente Olmedo, royal inspector of the Cinchona forests, many interesting accounts respecting objects which, but for the obliging communications from those friends, would have remained unknown to us. Respecting the very violent controversy on the question, whether the orange-coloured Cinchona bark of New Granada, or the Peruvian *Cinchona nitida*, described by Ruiz and Pavon, be identical with the genuine Cinchona of Uritusinga, famed already since 1638, he only can decide who has himself explored the regions producing these three plants. But of the contending parties, neither Mutis, Zea, nor Ruiz and Pavon, have ever set their feet in the corregiment of Loxa. Thence it is, that each party has, with equal want of foundation, asserted that the most efficacious Cinchona bark of their respective districts was the genuine one from Uristusinga. In the second fasciculus of our Æquinoctial Plants* we have shown, that this latter, the *Cascarilla fina de Loxa*, is entirely different from *Cinchona lancifolia* of Mutis, and from all those Peruvian Cinchona barks described in Ruiz's *Quinologia*, in the *Flora Peruviana*, and in the recent *Supplement* to the *Quinologia*. Averse as we are from entering into competition with the above-named excellent botanists, yet the accidental advantage has fallen to our lot, of having ourselves seen the Cinchona forests near Santa Fe, as also those of Loxa. In fact, for the last sixty years, since the time of Joseph de Jussieu, whose observations were moreover never published, no travelling naturalist has preceded us in visiting the beautiful mountain plains of Loxa. Favoured by these circumstances, I think myself enabled to speak with some confidence on so difficult a subject, which, by a variety of controversies, has become more and more perplexed.

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* Plantes Æquinoctiales, par Messrs. Bonpland et Humboldt. Troisieme livraison, p. 39.

It would be superfluous to repeat the fictions concerning the history of the discovery of the medicinal powers of the Cinchona bark. Some say a patient had drank out of a lake the waters of which had acquired a bitter taste from Cinchona trunks which had lain in them; others, that a lion had cured himself of the ague by chewing Cinchona bark, and had thus directed the attention of the Indians to this tree. Lambert, in his *Monograph of Cinchona*,[*] has collected all these opinions. That animals have taught men, is a very common form of the traditions of nations. The valuable antidote *Vijuco del guaco*, a plant described by Mutis, which is related to the *Mikania*, and has been erroneously confounded with the *Ayapana* of Brazil, is also said to have attracted the notice of the Indians (as is affirmed of the *Falco serpentarius*) by the *Falco guaco* of New Granada fighting with serpents. However, that the great American lion without mane, *Felis concolor*, should be subject to the ague, is just as bold an hypothesis as the assertion of the inhabitants of the pestilential valley Gualla Bamba,[†] that even the vultures (*Vultur aura*) in their neighbourhood were subject to that disorder. Indeed, in the regions of the Cinchona forests there is not even a *Felis concolor* so fond of warmth to be found; but at the most, the cat *Puma*, not yet properly described, (La Condamine's *Petit lion du volcan de Pinchincha*, which I should be inclined to call *Felis andicola*,) and which we have met with in heights of 2,500 toises.

The story, so often copied, respecting the Countess Chinchon, vice-queen of Peru, is probably still more doubtful than it is generally supposed to be. There certainly was a Count Chinchon, Don Geronimo Fernandez de Cabrera Bobadella y Mendoza, who was Viceroy in Lima from 1629 to 1639. It is very probable that his wife, after her return to Spain in 1640, was the first who introduced the Cinchona bark into Europe. The name of ***Pulvis Comitissæ*** appears even more ancient than that of ***Pulvis Jesuiticus*** or ***Pulvis Patrum.*** But I do not believe (and M. Olmedo in Loxa is of the same opinion with me) that the corregidor of Loxa, Don Juan Lopez de Cannizares,* who is said to have cured the Countess of the ague, received this remedy from the Indians. In Loxa there is no tradition whatever of this kind; nor is it probable that the discovery of the medicinal power of the Cinchona belongs to the primitive nations of America, if it is considered that these nations (like the Hindoos) adhere with unalterable pertinacity to their customs, to their food, and to their nostrums, and that, notwithstanding all this, the use of the Cinchona bark is entirely unknown to them in Loxa, Guancabamba, and far around. In the deep and hot valleys of the mountains of Catamago, Rio Calvas, and Macara, agues are extremely common. But the natives there, as well as in Loxa, of whatever cast, would die rather than have recourse to Cinchona bark, which, together with opiates, they place in the class of poisons exciting mortification. The Indians cure themselves by lemonades, by the oleaginous aromatic peel of the small green wild lemon, by infusions of *Scoparia dulcis*, and by strong coffee.† In Malacatis only, where many bark-peelers live, they begin to put confidence in the Cinchona bark. In Loxa there is no document to be found which can elucidate the history of the discovery of the Cinchona: an old tradition, however, is current there, that the Jesuits at the felling of the wood had distinguished, according to the custom of the country, the different kinds of trees by chewing their barks, and that on such occasions they had taken notice of the considerable bitterness of the Cinchona. There being always medical practitioners among the Missionaries, it is said they had tried an infusion of the Cinchona in the tertian ague, a complaint which is very common in that part of the country. This tradition is less improbable than the assertion of European authors, and among them the late writers Ruiz and Pavon, who ascribe the discovery to the Indians. The medicinal powers of the Cinchona was likewise entirely unknown to the inhabitants of the kingdom of New Granada.

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[*] A Description of the Genus Cinchona, 1792, p. 39.

[†] Near to the town of Quito.

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* Flora Peruviana, tom. ii. p. 2.

† Among the Indians on the Orinoco, particularly in Atures and Maypura, we have found an excellent febrifuge, the *frutta de Burro*, the fruit of a new species of *Uvaria*, which we have described by the name of *Uvaria febrifuga.*

A century elapsed before any botanical description was obtained of the tree whose pulverized bark yielded the Jesuit's Powder. The astronomer La Condamine, who ranged with indescribable vivacity through all departments of human knowledge, and by whom there are several neat botanical drawings in the collection of Jussieu in Paris, was the first man of science who examined and described the Cinchona tree. In the year 1737* he travelled through Loxa to Lima, and his description of the Cinchona appeared in 1738 in the *Mem. de l'Academie.* Afterwards, in the year 1739, Joseph de Jussieu explored the country in the vicinity of Loxa. There, and in the neighbourhood of Zaruma, he gathered a great number of specimens, which are still to be found in Jussieu's collection at Paris, and which we have compared with our own, collected sixty years later on the same spot. Amongst these was the *Cinchona pubescens,* which Vahl has described as new, but which, as we shall subsequently prove, is the first *Cinchona officinalis* of Linné's *Systema Naturæ* (12th edition). In the year 1743 La Condamine was a second time in Loxa, from whence he travelled, as we did in the year 1802, to Tomepinda and the Amazon river. At that time the first and (what is singular enough) the last attempt was made to bring young Cinchona trees alive to Europe. After the astronomer had carefully nursed them for eight months during a passage of 1200 leagues, they were swallowed up by a wave, which washed over the boat, near Cape Orange, north of Para.

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* Voyage à l'Equateur, p. 31, 75, 186, and 203.

Botanists for a long time were acquainted with only one species of Cinchona, which Linnæus called *officinalis*, and in the description of which, he united, without knowing it, our *C. Condaminea* and *C. cordifolia* Mutis; for the specimen sent him from Santa Fe was yellow Cinchona, and totally different from that drawn, though imperfectly, by La Condamine. At last Jacquin's voyage made us acquainted with another species, viz. the *C. caribæa*. The West India Islands, the South Seas, even the East Indies, offered from time to time more species of Cinchona to the traveller, but the most efficacious and the most remarkable ones of the continent of South America remained longest unnoticed.

From 1638 to 1776 no other Cinchona bark was met with in commerce, except that of the corregiment of Loxa and its neighbourhood. La Condamine makes mention of the bark from Riobamba and Cuenca in the province of Quito, as also of that from Ayavanca and Jaen de Bracamoros. But the bark from the interior of Peru (around Huanuca, and in the province La Paz) or even the bark from the kingdom of New Granada was entirely unknown to him.

They did not suppose it possible for Cinchona trees to exist north of the Equator, and consequently in our hemisphere, till a fortunate accident led a man, who had a long time lived in

Loxa, in some department connected with the peeling of barks, on his return to Spain, across Popayan to Santa Fe de Bogota. This observing traveller was the upper Mint Director *(Superintendente general de moneda de Santa Fe)* Don Miguel de Santistevan, who, without any botanical knowledge, discovered physiognomically, that is to say, by mere habitus, the Cinchona trees from Loxa up to 2½° N. lat. In a memorial concerning the royal administration of the whole trade of Cinchona bark *(Estanco de Cascarilla)* which in 1753 he addressed to the viceroy Marquis de Villar, he expressly says that he had found Cinchona trees not only betwixt Loxa and Quito, for instance, easterly from Cuenca near the villages Paute and Gualasco, westerly from Riobamba on the declivity of the Chimborazo near Angas, and on the Cuesta de S. Antonio, but also betwixt Quito and Santa Fe in all situations, where the ground is of an equal height with Loxa, consequently 800 toises above the level of the sea. The estimate of the height according to modern measurements, and even according to the earlier ones of La Condamine,* is certainly too low by at least 250 toises; but the acute observation, respecting the mean height in which the Cinchona trees are always met with on the mountainous declivity, is the more striking, since even learned philosophers at that time paid attention to the geography of plants, or to the height of their situation. It is also to be observed, that although M. Santistevan, according to the manuscript accounts which I procured of him, speaks generally of Cinchona trees betwixt Quito and Santa Fe, yet we can perceive from his enumeration of particular places, that he discovered this precious produce only in the valley of Rio Tuanamba north of Pasto, in the forests of Beruccos, and in the vicinity of Popayan, near Guanacas, the dangerous pass of the Andes, betwixt the village of this name and the Sitia de los Corrales.

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* Voyage de la Rivière de l'Amazone, p. 25.

Such was the state of the discovery of Cinchona north of the equator until the year 1772. All the Cinchona bark of commerce was from Loxa, Gauancabamba, and Jaen, perhaps even from Riobamba and Cuenza. The whole was shipped at the ports of the Pacific. No advantage was derived from the important discovery in the provinces of Pasto and Popayan. In the year 1772 Don Jose Celestino Mutis discovered the Cinchona about Santa Fe, and since this epoch Europe received Cinchona bark which did not double Cape Horn, and which came by way of Carthagena de Indias to Cadiz.

M. Mutis had resided already twelve years in the kingdom of New Granada. He had travelled twice through the forests between Guaduas and Santa Fe, where the Cinchona tree is surrounded by the beautiful Granada oaks. If we consider the diversity of plants which engage the attention of the botanist in these countries; if we reflect that in the tropics the height of the trunks withdraws from our eyes both leaves and blossoms; we shall be the less surprised that M. Mutis discovered the Cinchona only in 1772, when he found it in blossom. This excellent explorer of nature, who is a native of Cadiz, studied three years in Madrid, and was induced by a love of botany to accompany the viceroy Don Pedro Misia de la Cerda, as his physician, to Santa Fe. He lived a long time in the districts of Pampelona and de la Montuosa, a name which, to the greatest dissatisfaction of M. Mutis, Linnæus has construed into Mexico; so that this Swedish botanist has quoted all the New Granada specimens which he received from la Montuosa, as Mexican ones.* This error is the more singular, since Linnæus, who corresponded with Mutis always by way of Carthagena de Indias, must have perceived that he never resided in Mexico. The absence of M. Mutis in the mines north of Santa Fe had kept him far from the Cinchona forests of Mave, Gascas, and the Aseradero. Mutis, in a report to the viceroy Don Manuel Antonio Florez, alleges as a ground of the later discovery of the Cinchona, that up to 1772 he had directed all his botanical excursions out of the limits of the first 5 degrees of N. lat., which he held to be the exclusive country of the Cinchona in the northern hemisphere. This great naturalist did not at that time suspect, that soon afterwards the Cinchona tree would be found to exist even at the mouth of the Rio Opon, and as far as Santa Martha, consequently in the 10th degree of N. lat.

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* For instance, *Mannettia reclinata.*

Mutis had procured the first dried specimens of the yellow Cinchona of Loxa (*C. cordifolia*) from M. Santistevan, director of the Mint. According to these, the genus *Cinchona* was established in such manner as he communicated it to Linnæus. In the year 1772, when M. Mutis, in company with his friend Don Pedro Ugarte, rode through the forest of Tena, not far from the mountainous declivity of Santa Fe, he discovered Cinchona trees. A year afterwards he also found them betwixt Honda and Guaduas; and presented to the viceroy Don Manuel de Guirior, who had just embarked on the Magdalen river, a flowering branch of Cinchona, as a newly-discovered valuable product of that country, which nature had also enriched with aromatic Nutmegs (*Myristica Otoba*), with an excellent Cinnamon tree (*Laurus cinnamomoides* Mut.) with aromatic *Puchery* or *Todaspuie* (*Laurus*[*] *Putseri* Mut.), with Almonds (*Caryocar amygdaliferum* Mut.), with four kinds of Styrax, with the Balsam of Tolu (*Toluifera** *indica*), with a Tea tree (*Alstonia theæformis* Mut.), with Ipecacuanha (*Psychotria emetica* Mut.), with Wax-palms (*Ceroxylon andicola* Humb.), with Carannia gum (*Æginetia cannifera* Mut.), with Winter's bark (*Wintera granadensis*), with *Quassia simarouba*, and with the valuable dyeing woods.

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[*] The *Laurus Putseri* of Mutis is the same as the *Laurus Pucheri* of *Fl. Peruviana*, vol. iv. t. 352. ined. The number of species of this genus figured in the fourth vol. ined. of the *Flora Peruviana*, amounts to thirty. The fruit of the *Laurus Pucheri* is frequently sold in the London shops under the name of Sassafras nuts. *Caryocar amygdaliferum*, *Fl. Peruv.* vol. v. ined. t. 470. *Myrospermum balsamiferum*, *Fl. Peruv.* 4, ined. t. 373.

In the history of sciences, it often happens that the person who knows how to diffuse, with a certain degree of boldness, the discovery of another, passes for the discoverer himself, instead of him who made that discovery. M. Mutis, a man of a liberal and enlightened mind, asked no reward from the Government. He occupied himself without ostentation in botanical examinations of the kinds of Cinchona which he discovered, and in the application of their barks through an extensive medical practice. In the year 1783 only, he obtained a royal salary, when the botanical expedition of Santa Fe was organized by M. Gongora, who was both archbishop and viceroy.

In the year 1776, four years after M. Mutis's discovery, Don Sebastian Jose Lopez Ruiz, a cunning and petulant physician at Santa Fe, a native of Ganama, found means to persuade the Spanish Government that he had first discovered Cinchona trees in New Granada. He sent samples of the new Cinchona to Madrid, spoke a great deal of the importance of this new article of commerce, and obtained a yearly pension of 2000 piastres for his reward. From records which M. Lopez remitted to me in the year 1802, by his brother, a canon in Quito, in order to prove to me the priority of his discovery, I have found that he knew the Cinchona about Honda only in the year 1774, and that he made the first medicinal experiment with it in the year 1775. M. Lopez did not long enjoy his full salary. The viceroy Gongora, who besides esteemed M. Mutis greatly, and his first secretary Don Zenon de Alonzo, who was a zealous promoter of the sciences, represented to the Court, that M. Lopez was not the first discoverer of the New Granada Cinchona bark. They immediately withdrew one half of the royal pension, ordered M. Lopez to travel to the Darien, where it was also pretended that Cinchona had been discovered; and as he refused to undertake a journey to such a pestilential climate, the viceroy discontinued the other half of his salary. Since this epoch a violent dispute has arisen respecting the priority of the discovery. Lopez made a voyage to Europe, and again contrived to procure for himself a salary of 1000 piastres. He ingratiated himself with M. Mutis's botanical opponents, and these have mentioned him frequently since as co-discoverer. It is still more remarkable, that Colonel Don Antonio de la Torre Miranda wishes to prove, in his Topography of the province of Carthagena, (*Noticia individual de los Poblaciones nuevas fundadas en la Provincia de Carthagena,*) by means of testimonies, that to him belongs the honour of discovering the Cinchona bark in New Granada, because in the year 1783 (consequently eleven years after M. Mutis) he had discovered it near Fusagasuga. M. Mutis had begun, in Mariquita, a plantation of Cinchona and of Cinnamon[*] of the Andaquia Missions, the remains of which we also saw. In the year 1800 the Spanish Government commissioned a French physician, M. Louis Derieux, to continue these plantations; to cultivate the indigenous *Myristica,*[†] and to superintend generally the packing of the Cinchona bark in New Granada. He received a salary of 2000 piastres, with the title of *Commissionado y Encargada de Investigaciones de Historia Natural en el Nuevo Reyno de Granada.* He possessed as little botanical knowledge as M. Lopez, but was a man of strong mind and intellectual capacity. He had long before lived in Santa Fe, from whence he was dragged in chains to Carthagena, and thence to a prison in Cadiz, under the false accusation of revolutionary principles. After his innocence had been acknowledged, the Minister of State Don Mariano de Urquijo conferred on him the superintendance of the Cinchona forests. I travelled with him upon the Magdalen River, during which time his amiable son made several drawings of plants for me. The father stepped forth betwixt M. Mutis and M. Lopez. As the specific characters of the species of Cinchona excited the bitterest disputes between Zea, Ruiz, and Pavon, at Madrid, so the Cinchona bark, ever since its first discovery, has been an odious object of persecution in Santa Fe. I have learned with great regret, that soon after I left South America, M. Derieux had lost his salary, and had even been compelled to leave the vice-royalty, so that the Cinchona trees again grow without any superintendance, which, indeed, has hitherto not promoted their increase or preservation.

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* *Myrospermum balsamiferum.*

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[*] *Laurus cinnamomoides,* Mutis.—Edit.

[†] *Myristica otoba,* Humb. et Bonpl. Plantæ Æquin. 2. p. 78. tab. 103.—Edit.

In this simple historical narrative we have shown, that till the year 1772 all Cinchona bark was collected in the forests of Loxa, Ayavaca, and Jaen de Bracamoros, consequently between the 3rd and 5th degrees of south latitude, and that only from the year 1772 the medicinal Cinchonæ on the South American continent became used in the northern hemisphere; which species of Cinchona were discovered between the 4th and 5th degrees of south latitude. Until then, none were known in Peru Proper, especially in the mountains situated nearer to Lima, the capital. The vale of Rio Calvas, and the village Ayavaca, in whose neighbourhood the *Cinchona Condaminea* grows, famed since the year 1738, belong indeed in a political respect to Peru, but both are situated close to the confines of the corregiment of Loxa; and the bark of Ayavaca, like that of Jaen, was sold by the name of *Cascurilla fina de Uritusinga*, as well as that which was shipped in Payta.

It was only in 1776 that the real commerce in Peruvian Cinchona bark began. Don Francisco Renquifo discovered near Huanuco, on the mountain San Christo val de Cuchero, the *C. nitida* of Ruiz, a species very nearly related to the orange-coloured one of Mutis (*Cinchona lancifolia*). An enterprising man, Don Emanuel Alcarraz, brought the first sample of it to Lima, and turned the use of it to advantage. The editors of the *Flora Peruviana* did certainly not penetrate, in 1779, as far as the Amazon River itself, but only to those rivers which flow immediately into it. They visited the beautiful valleys of Tharma, Xauxa, and Huamalies, and in 1779 determined the botanical characters of the North Peruvian species. This was consequently seven years after M. Mutis began his labours on the Cinchonæ of New Granada. Shortly afterwards, medicinal Cinchona bark was discovered at almost one and the same time in the most northern and in the most southern part of South America, in the mountains of Santa Martha, and in the kingdom of Buenosayres, near La Paz and Cochabamba, where a naval officer, Rubin de Celis, and the German botanist Taddæus Haenke, drew the attention of the inhabitants to this valuable produce.

After the year 1780, therefore, Europe was superabundantly supplied from the ports of Payta, Guayaquil, Lima, Buenosayres, Carthagena, and Santa Martha, with Barks of various medicinal powers. Of these barks, some went direct to Spain, and some were transmitted by the smuggling trade to North America and England. West-Indian Cinchona barks were also occasionally mixed with those of the continent. They gave the name of Cinchona to barks which indeed possess great febrifuge powers, but which are derived from trees which do not even belong to the genus *Cinchona*. Thus they spoke in Cadiz of *Cascarilla* or *Quina de*

Cumana and of *Quina de la Angostura*. They divided all bark into genuine and into spurious, without considering, that, although true Cinchona barks possess equal medicinal power, yet that they are capable of displaying specific differences in the manner of their efficacy. They asked for bark like that of Loxa, without considering that three or four kinds of Cinchona bark had ever since 1738 come from Loxa itself to Europe, which were the produce of quite different species of Cinchona. They forgot that the quality of the bark did not depend merely on its being from the *C. lancifolia* or from *C. macrocarpa*, but that locality of growth, the age of the tree, quick or slow drying, determine its efficacy. They mistook the same species, if the bark was, instead of *canutillos*, *i. e.* in thin quills, in thick *cortizones*, or even powdered. They mixed, sometimes through mistake, sometimes intentionally, the bark of *Wintera granadensis* and of the tanning *Weinmannias*, with the Cinchona bark, and even stained them with an infusion of Brazil wood.

These circumstances gave rise to very singular prejudices in judging of Cinchona bark. Certain mercantile houses in Spain, which half a century since were in possession of the exclusive trade in Cinchona bark, endeavoured to throw disrepute on that from New Granada and southern Peru. They found complaisant botanists, who, by boldly exalting varieties to species, proved that all Peruvian Cinchonæ were specifically different from those which grow about Santa Fe. Physicians, like the Popes, drew lines of demarcation on the map. They insisted, that beyond a certain degree of latitude in the northern hemisphere no efficacious Cinchona could grow. But as the commerce with Cinchona bark from Huamalies and Huanuco, which Ortega, Ruiz, Pavon, and Tafalla recommended, soon fell into the hands of those who had formerly carried on the South Sea trade in the

Cinchona bark of Loxa, the new Peruvian Cinchona barks naturally gained easier access into Spain than those from Santa Fe. The latter, on the contrary, which the English and North Americans could easily procure in Carthagena, as a port more accessible to the smuggling trade, obtained a preferable fame in London, Germany, and Italy. The effect of mercantile cunning went so far, that, at the royal command, a quantity of the best orange-coloured Cinchona bark from New Granada, which M. Mutis had caused to be peeled at the expense of the king, was burned, as a decidedly inefficacious remedy, at a time when all the Spanish field-hospitals were in the greatest want of this valuable product of South America. A part of the Cinchona bark condemned to destruction was secretly bought by English merchants in Cadiz, and publicly sold in London at high prices. Since M. Zea, the present director of the botanic garden at Madrid, has maintained, in the *Annales de Ciencias Naturales,* against the editors of the *Flora Peruviana,* that their Peruvian species of Cinchona are identical with those of M. Mutis, but that they have described one and the same species under two or three names, the dispute concerning the quality of Cinchona bark from Santa Fe has again become very animated. The Supplement of the *Quinologia,* by Ruiz and Pavon, is written with a bitterness which ought always to remain foreign to the calm course of scientific inquiries.

Before we proceed from the history of the discovery of the Cinchona to its geographical diffusion, and their remaining physical relations, we must cast a glance upon the specific differences of the several kinds of Cinchona. A properly complete botanical disquisition is foreign to the purpose of this Treatise. M. Bonpland and myself will attempt it on another occasion, viz. in the description of the two thousand new species of plants discovered during our expedition, and partly determined already by our excellent friend M. Willdenow. As almost every species of Cinchona is peculiar to its own region, to its own altitude on the mountainous declivity of the chain of the Andes, it is unavoidably necessary, for the satisfactory treatment of the subject, to adjust at least the synonymy of the most important officinal species. I shall certainly make mention of that only, which I have had the opportunity of observing with my own eyes.

ON THE

CINCHONA FORESTS OF SOUTH AMERICA.

BY A. VON HUMBOLDT.

SECTION II.

THE genus *Cinchona* belongs to those tribes of plants, whose species have been considerably multiplied of late. Linnæus knew but two of them, viz. *C. officinalis* and *C. Caribæa*. Vahl,[*] in his treatise on Cinchona Bark, enumerates nine; Lambert,[†] in his English Monograph, eleven; Persoon, in his little ***Enchiridium Botanicum***,[‡] one-and-twenty species. If we yet add to these, two ***Cosmibuenæ*** of the ***Flora Peruviana***, belonging formerly to the genus ***Cinchona***, the ***Cinchona excelsa*** of Roxburgh, found in the East Indies, my ***C. Condaminea***, Vavassour's *C.* ***spinosa***, and Willdenow's yet undescribed small-leaved *C.* ***brasiliensis***, for which we are indebted to Count Hoffmannsegg in the expedition instituted by him for objects of natural history, then the number of species of Cinchona appears to have increased to twenty-seven. The authors of the ***Flora Peruviana*** alone have entertained the notion of describing thirteen new species, while M. Mutis has reduced all the ***Cinchonæ***, examined by him in South America, to seven only. Even Professor Zea, in the *Annales de Ciencias Naturales de Mudrid,*[*] has ventured to prove that almost all the efficacious species, enumerated by Ruiz and Pavon, can be reduced to four, viz. *C. lancifolia*; *C. oblongifolia*, *C. cordifolia*, and *C. ovalifolia*, described by Mutis, in the year 1793, in the literary news of Santa Fe de Bogota.[†]

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[*] Skrivter of Naturhistorie Selskabet, B. i. H. i. p. 16.

[†] Description of the genus *Cinchona*, 1797.

[‡] Synopsis Plantarum, P. i. p. 196.

Indeed I hardly know any one tree varying more in the shape of its leaves than the Cinchona. Whoever determines single specimens of dried collections, and has no opportunity to examine or observe them in their native forests, will, as is the case with the *Broussonettia papyrifera*, be led to discover different species by leaves which are of one and the same branch. The yellow bark, *C. pubescens*, Vahl, we have found at one and the same time with *fol. ovato-oblongis*, *ovato-lanceolatis*, and *ovato-cordatis*. Mutis calls it *C. cordifolia*, because it is the only kind on which sometimes cordate leaves are found. The same species varies like the white Cinchona, *C. ovalifolia*, Mut. (*C. macrocarpa*, Vahl) *foliis utrinque levibus* and *foliis utrinque pubescentibus*. These varieties are represented in those well executed coloured drawings which M. Mutis presented me during my residence in Santa Fe, and which have been deposited, together with a complete *hortus siccus* of my expedition to the tropics, in the *Jardin des Plantes* at Paris. Even the laurel-leaved *C. Condaminea*, the finest bark from Uritusinga, has very diversified leaves, according to the altitude at which it grows, and which equals that of Saint Gothard's or Mount Ætna. It would deceive the bark-peelers (*cascarilleros*) themselves, if they did not know the tree by the glands, left so long unobserved by botanists. In Gonzanama, not far from Loxa, we made a great number of impressions, by means of printer's ink, from these heterogeneous forms of leaves, in order to prove how unsafe all those distinctions are, which have been derived from the leaves only. The long known but yet very imperfect method of ectypa is particularly advantageous for this and similar purposes, as it offers to much-occupied travellers the means of procuring in a few minutes the most correct outlines.

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[*] Anno 1801, No. 5.

[†] Papel Periodico de Santa Fe, 1793, No. 111.

The more the Cinchona trees vary in the shape and smoothness of the leaves, according to the altitude in which they grow; to the severity or mildness of the climate; to the trees standing singly, or being closely surrounded by other plants; to the luxuriance of growth, and greater or less humidity of the soil; the more necessary is it, with regard to the *diagnostic* indications, to pay attention to the form of the flowers, particularly to the length of the anthers, to the proportion between the stamens and anthers, as also between the free and the adherent part of the filaments. It is not sufficient to examine the species in such as have a smooth or hirsute corolla, or the stamens exserted, or inclosed in the tube of the corolla. An attentive observer finds in almost every species a striking difference in the structure of the corolla. Thus, the *C. parviflora*, Mut. has pubescent filaments, and dilated at the base. *C. macrocarpa*, Vahl, anthers nearly sessile, placed in the upper part of the tube of the corolla. *C. oblongifolia*, Mut. filaments very short, anthers situated below the middle of the tube of the corolla. The *Cinchona ovalifolia*, Mut., or the white Cinchona, varies frequently with from six to seven, the *C. Condaminea* with from three to four stamens only. In the first, the limb of the corolla is frequently found divided into six or seven, in that of the latter, mostly into four segments. In the *Cascarilla fina de la Provincia de Jaen*, which M. Bonpland intends shortly to describe, I found the anthers always shorter than the free part of the filaments, and this free part again longer than the adherent one. On the other hand, I oberved that in the *Cascarilla fina de Uritusinga*, or the *C. Condaminea*, the anthers are twice the length of the free portion of the filaments, and the free parts are two-thirds shorter than the adherent one. There is scarcely any mention of these proportions in the otherwise excellent descriptions of Cinchonæ for which we are indebted to Vahl, Swartz, and the authors of the *Flora Peruviana*. In the mercantile world, several barks are called Peruvian bark which do not belong to the genus Cinchona. Thus, the excellent remedy which the Catalan Capuchin friars of the missions on the River Carony first made known, was called in Spain *Quina de la Guayana*, or *de la Angostura*. M. Mutis became acquainted with this bark in 1759 in Madrid, at the house of Don Vincente Rodriguez de Rivas:* he employed it in his medical practice, and even then supposed that it did not belong to the genus *Cinchona*. Lœfling died in the missions of Carony without knowing this valuable substance. It was afterwards ascribed, sometimes to the *Brucea ferruginea*, which however grows in Abyssinia; sometimes to the *Magnolia glauca*; sometimes (which certainly was more probable) to the *Magnolia Plumieri*. In our expedition we had an opportunity of examining botanically the Cuspare tree, which yields the *cortex Angosturæ*. We discovered it to be a new genus, on which our excellent friend Willdenow, in the Transactions of the Royal Academy of Berlin, has conferred the name of *Bonplandia*.† This name of my travelling companion has been retained for the Cuspare plant, since we have changed the Mexican *Bonplandia geminiflora*, described by Cavanilles, to *Caldasia heterophylla*.

The bark of Cumana, which for the last four or five years has been sent to Spain, through the exertions of Governor Don Vincente Emparan, under the name of *Cascarilla de Nueva Andalusia,* is likewise different from Cinchona. A chemist would hardly be able to distinguish this Cuspa bark from true Cinchona bark. It is an excellent remedy in the ague. Although we observed for almost a twelvemonth the Cuspa trees of Rio Manzanario near Cumána, yet it never fell to our lot to meet with its flowers. We do not know, therefore, by what distinctive mark it differs from the genus *Bonplandia* and *Cinchona.* The want of stipulæ, however, the situation of the leaves, and the whole habitus, make it more than probable that the *Cuspa* is not a *Cinchona.* The absence of stipulæ is particularly striking. Yet notwithstanding its alternate leaves, the Bark-tree of Cumana might still be a Cinchona, for the same reason that *Cornus alternifolia* stands isolated amongst twelve species of *Cornus* with opposite leaves. It has likewise remained doubtful to us, whether the bark of Acatamez, a village situated westward of Ville de Ibarra on the coast of the South Sea, betwixt Rio Verde and Rio Esmeraldita, be the produce of a species of Cinchona. The flower of this Acatamez bark-tree, with which we became acquainted during our stay in the town of Popayan, has not been hitherto examined by botanists. Mr. Brown, who long before us was in the South Sea, (in 1793,) has already given some account in Lambert's Monograph of Cinchona* of this new species of the torrid zone. Either from want of geographical information, or by corruption of the name, he calls it *Bark of Tecamez,* instead of *Cascarilla of Acatamez.*

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* Papel periodico de Santa Fe, No. 95. p. 337.

† Samml. Deutscher Abhandl. für 1801 und 1802, S. 36.

A fourth tribe of plants producing Peruvian bark, although of less medicinal power, is the genus *Cosmibuena* of the *Flora Peruviana.* To this belongs *Cinchona longiflora,* Mut. or *C. gran-*

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* Lambert, p. 30.

diflora, Ruiz. It is a tree of great beauty, which we have frequently seen in deep hot valleys exhibiting its beautiful fragrant blossoms. The stamens lie deep and hidden in the tube of the corolla; and the fructification is so similar to that of the other species of Cinchona, that the *Cosmibuena* can hardly be admitted to constitute a distinct genus.

On the other hand, it might be advisable to form the *Cinchonæ* with long stamina far projecting from the tube of the corolla, such as Jacquin's *C. Caribæa*, Swartz's *C. angustifolia*, *C. brachycarpa*, and *C. floribunda*, into a separate genus nearly allied to Cinchona. The seven species belonging to it possess this peculiarity, that all of them, except one, inhabit islands, viz. the Philippine, the West Indian, and the South Sea Islands, and that they prefer hot valleys, or even plains, to a high mountainous situation. I know but two species upon the South American continent which have *stamina exserta*, Lambert's *C. longiflora* from French Guiana, and the yet undescribed *Cinchona dissimiliflora*, Mut. (*staminibus longe exsertis, corollæ laciniis tubo longioribus, foliis cordato-oblongis*) which, in the kingdom of New Granada, descends from the declivity of the mountains towards the plains as low as 200 toises above the level of the sea. *C. Caribæa* and *C. angustifolia* are found in the West Indies in still lower spots, even in regions which are sufficiently warm for plantations of sugar canes. All these Island Cinchonæ with projecting stamens have a smooth corolla. All of them have a capitate or obtuse stigma, the *C. Philippina*[*] alone excepted, which M. Nee discovered at Santa Cruz de la Laguna, near Manilla. A divided stigma is, on the contrary, observed in all Cinchonæ with inclosed stamens. The corolla of the latter is sometimes smooth, sometimes hairy. M.

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[*] Cavanilles Icones, t. iv, p. 15, 1, 329.

Mutis has already proposed, in the literary News of Santa Fe, to separate the Cinchona with long projecting stamina from the rest. "I know not," says he, "what my friend Linnæus thought of the Cinchona of the South Sea, for its reception in the Supplement only proves the favour of the son, whose opinion has not with me the weight of the opinions of the father." The authors of the *Flora Peruviana* wish to make the Island-Cinchonæ, *Portlandiæ*;* but M. Swarz, in Schrader's *Journal für die Botanik*,† proves, that in the Island-Cinchonæ, as in those of the continent, the capsule is a dissepimentum loculorum exacte parallelum, and in *Portlandia* a dissepimentum vere contrarium. Ruiz's *Portlandia corymbosa* is therefore no *Portlandia*, but belongs to the *Cinchonæ filamentis e basi tubi ortis*, to *C. Caribæa*, *C. floribunda*, and *C. brachycarpa*, a groupe of plants which M. Swarz also wishes to unite into a separate genus on account of the flower, but not on the score of fructification. The *C. excelsa*, with enormous leaves, frequently of twelve inches length and fifteen inches breadth, discovered in the East Indies, stands almost in the middle, betwixt the West-Indian and South-American Cinchona, and its existence seems to dissuade us, as it were, from the proposed separation of the two tribes. However, the *C. excelsa* Roxb. approaches less to the Island-Cinchona than to the New Granada and Peruvian ones, corolla pubescenti, staminibus medio tubi insertis, nec e basi tubi nascentibus, antheris nec filamentis exsertis, margine seminum lacero, haud integro. The antheræ in this East India species are eight times longer than the filaments. It is difficult to find reasons for uniting the Island-Cinchonæ into a separate genus, in the formation of the fruit. They differ‡ from the Cinchonæ of the continent of South

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* Flor. Peruv. t. ii. praef. and p. 49.

† Band. I. p. 358.

‡ Schrader, a. a. O. S. 359.

America, "valvulis minus extrorsum divergentibus et receptaculo ovato nec lineari seminumque margine integro nec lacero." But except the smooth unindented coat of the seed wings, which I mostly find, the remaining forms of the fruits exhibit gradations, which link together, as it were, all the Cinchonæ. For the new genus of Island-Cinchonæ, delighting in hot plains, there would consequently remain: corolla glabra, filamentis longe exsertis ex basi tubi nascentibus. Semina margine integro cincta. Stigma simplex capitatum. But 1°. Many Cinchonæ staminibus inclusis, and *C. grandiflora* Ruiz, have corollam glabram. 2°. *C. Phillippina* has far projecting filaments, stigma bilamellatum, and yet, as it appears, semina margine integro cincta. 3°. *C. excelsa* has stigma subcapitatum leviter emarginatum, the seed not indented, and the filaments not projecting. Under these exceptions, it would certainly be bold to separate tribes of plants so nearly allied.

The singular prickly *C. spinosa* of St. Domingo appears at first sight to belong least to the genus Cinchona. It is wonderfully small-leaved, and has frequently folia terna verticillata. Another prickly Cinchona differs still more in colour from the genuine Cinchona bark trees; it grows near Guayaquil, on the coast of the Pacific, and M. Tafalla showed it to us in the winter of 1803, during our stay there. This undescribed species is a creeper, and on that account in some measure related to the genus *Danais* from Madagascar, which Persoon ranks next in succession to the *Portlandia*, since the *Pædeira fragrans*, more resembling the Cinchona, has been separated from *Pædeira fœtida*. This new C. *scandens* of Tafalla has in other respects the complete fructification of the ague-curing Cinchona, and belongs indisputably to the most remarkable phenomena of the physiognomy of plants.

The very same fruit of the genuine Cinchona is also produced by ***Pinkneya pubens*** Michaux,* a tree which I found cultivated together with *C. Caribæa* in the excellent botanic garden of Mr. Hamilton near Philadelphia. The ***Pinkneya*** grows on Mary's River, in the province of Georgia, and is already described by Bartram, propter calycis laciniam unicam foliaceam bracteæformem, by the name of ***Mussuenda bracteolata.*** The medicinal powers for the cure of ague possessed by this plant, nearly allied to the genus Cinchona, and growing without the tropics, have not yet been investigated. On the other hand Mr. Walker has shown in two excellent treatises, that the bark of ***Cornus florida*** from Virginia, and of ***C. sericea*** from Pensylvania and South Carolina, and even the Tulip tree ***(Liriodendron Tulipifera)*** may be used with advantage in North America as remedies against agues.† In the kingdom of New Spain, where hitherto no species of Cinchona has been discovered, as the curator of the Academical Botanic Garden at Mexico has assured me, the yet undescribed ***Portlandia mexicana,*** discovered by M. Sesse, may supply the place of the Cinchona bark of Loxa. In the East Indies (according to D. Klein in Tranquebar) the ***Swietenia febrifuga,*** figured by Roxburgh, a plant of Swarz's and Jacquin's, ***Portlandia hexandra*** (Aublet's ***Coutaria Speciosa),*** nearly allied to Cinchona, produces the bark of French Guyana, known in France by the name of ***Ecorce fébrifuge de Cayenne,‡*** and which is no more derived from a Cinchona, than is the bark of Cumana or the Cuspare of Angostura.

Thus much respecting the generic characters of the plants which approximate to Cinchona, and all of which belong to the great family of *Rubiaceæ*. We see that as Caoutchouc* is obtained in abundance from the juices of the most diversified plants on the Orinoco and in Cayenne; from the *Hevea* on the Canno Pimichin, a branch of the Negro; from the tree *Jacio* in the kingdom of New Granada; from a new species of *Ficus* in the province of Popayan, near the Indian village La Cruz; from a *Lobelia* (to be described by us) in Bengal; from the *Urceola elastica*, figured in the 5th volume of Asiatic Researches; in Madagascar, from the *Commiphora madagascarensis*; so does nature also offer to us the ague-curing principle, or that mixture containing tannin and absorbing oxygene, which we obtain of a preferable quality from *Cinchona Condaminea*, *C. pubescens*, Vahl. and *C. lancifolia*, Mut. in plants which do not even belong to one and the same genus. A chemist would perhaps find greater differences between the West-Indian and South-American Cinchona barks, than between the Cuspa of Cumana and the Cinchona bark of Loxa; and yet the Cuspa tree, *foliis alternis, stipulis nullis*, is most probably a very remote genus from Cinchona.

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* Flor. Americana, I. p. 105.

† Walker on the virtues of the *Cornus* and the *Cinchona* compared. Philad. 1803. Rogers's Diss. on the properties of the *Liriodendron.* Phil. 1802.

‡ Ventenat Tableau du Regne Vegetal, t. ii. p. 57?.

After we have separated with care, partly what in a botanical point of view is nearly related to Cinchona, partly what passes in commerce amongst different nations by the name of China, Cascarilla, Quinquina, or Ecorce fébrifuge; after we have separated the Cinchonæ with inclosed filaments, not growing from the lower end of the flower tube with divided stigma and indented margins of the seeds, from the Island-Cinchona, whose long projecting filaments grow from the bottom of the flower tube, and which have, together with unindented seed wings, an undivided stigma; after we have examined the relation and supposed similarity of mixture of Cinchona, Portlandia, Coutarea, Cosmibuena, Pinkneya, Danais, Bonplandia, Cuspa, and the Acatamez tree, we pass to the definition of those species of Cinchona which have become an object of great importance in the practice of physic and in the intercourse of nations. Without the fundamental exposition of the specific characters, and without adjusting some part of the synonymy, every thing which I am going to state respecting the geographical diffusion of the Cinchonæ, and their physical relations, would remain indistinct and dubious, since (as I have mentioned above) a peculiar region has been destined for almost every species, and some botanists have, to the great detriment of science, given one and the same name to the most heterogeneous species. Thus, for instance, *Cinchona longiflora*, Mut. is totally different from *C. longiflora*, Lambert. It is true, they both have a smooth corolla, and belong to the Cinchonæ which are fond of heat and possess fewer medicinal powers. But the first, from New Granada, has inclosed stamens, and is probably identical with *C. grandiflora Flor. Peruv.* On the other hand, the *C. longiflora*, Lambert, from French Guiana, belongs to those species which have long projecting filaments and very short capsules. *Cinchona Caribæa*, Jacq. is totally different from that *Cinchona Caribæa* described in the *Journal de Physique*, Oct. 1790. The diagnoses which I add are not borrowed from works already published, but arise partly from my own observations made from nature itself, partly from an instructive intercourse with M. Mutis.

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* The *Cecropia peltata* is frequently mentioned as a tree yielding a part of the American caoutchouc. But I doubt whether any part of the new continent makes use of a juice so difficult to inspissate.

Characteristics of some Species of Cinchona.

Vahl, in his excellent Monograph, augmented by Lambert, divides all the species into two groupes of plants, floribus tomentosis, staminibus inclusis, and floribus glabris, staminibus exsertis. This division possesses this fault, that two characters are placed opposite each other, which are by no means observed at one and the same time in all the species at present known. Certainly no Cinchona with tomentose flowers has long projecting stamens, for in the East Indian species the anthers are merely visible; but there are Cinchonæ which have, like *C. parviflora*, Mut. and *C. grandiflora, Flor. Peruv.* a smooth corolla and inclosed stamens. With more, although not with perfect justice, we might separate Cinchonæ staminibus inclusis, stigmate bilamellato, seminum ala denticulatâ vel lacerâ, and Cinchonæ filamentis insertis ex imo tubi nascentibus, seminibus membranâ integrâ cinctis. However, it seems more correctly logical to divide the Cinchonæ into those with smooth and into those with hairy corollas. The first division merely subdivides itself, according to the length of the stamens, into two smaller tribes, and (what is certainly an important object) all the useful and ague-curing species associate into one groupe.

A. Cinchonæ corollis tomentosis.

1. *C. Condaminea, corollæ tubo hirto, foliis ovato-lanceolatis utrinque glaberrimis, in axillis nervorum inferne scrobiculatis. Humb. et Bonpl. Plant. Æquin. fasc.* ii. *p.* 29. *tab.* 10.

This species, the fine bark of Uritusinga, could only be taken for the *C. glandulifera*, *Flor. Peruv.*; but this latter differs corollâ solummodo intus lanuginosâ, tubo externe glaberrimo, foliis inferne villosis.* The inhabitants also enumerate the *C. glandulifera*, which is called (at Chicoplaya) Cascarilla negrilla, among the less efficacious species of Cinchona.

If any one species deserved exclusively the name *C. officinalis*, it would be the tree which produces the Cascarilla fina de Uritusinga, a bark which has always been held in Spain as the most efficacious in tertian agues, and which at present is gathered only for the Royal Apothecaries' Hall, and is therefore never met with in trade by lawful channels. Notwithstanding these preferences, we have, for several reasons, preferred giving it a new name, not derived from its quality or medicinal powers. 1°. Not one species, but all provided with hairy and woolly blossoms, are Cinchonæ of the shops, and no species deserves an absolute preference, since different species are to be applied according to the difference and form of the disease: for instance, in intermittent fevers of long standing, the *C. Condaminea* and *C. lancifolia*, Mut.; in diseases of the muscles or suppurating ulcers, the *C. oblongifolia*, Mut.; in the after treatment, to prevent relapses, the more mild *C. cordifolia*, Mut. 2°. In botanical writings, species of Cinchona totally distinct have been described by the name of *C. officinalis*. Had we bestowed the same name on the Cinchona of Uritusinga, it would have been confounded with the yellow *C. cordifolia*, Mut., the white *C. macrocarpa*, Vahl, or even with the *C. nitida*, Ruiz, which at different periods have been called *C. officinalis*.

This latter point, equally important to the botanical synonymy and to the materia medica, merits a more circumstantial explanation. It is asked, What plant did Linnæus, in the 12th edition of the *Systema Naturæ*, call *C. officinalis?* Vahl maintains that it was his *C. macrocarpa*[*] from the kingdom of New Granada, which he received from Ortega. But since *C. macrocarpa*, Vahl is nothing else but our white large-flowered Cinchona of Santa Fe, *C. ovalifolia*, Mut.; and as, according to M. Mutis's own testimony, it had never been seen by Linnæus, then the *C. macrocarpa*, Vahl cannot be quoted as synonymous with *C. officinalis*, Linn. *Syst. Nat. ed.* 12. The great botanist of Copenhagen, whose early death is so justly deplored by all the friends of science, was misled to an erroneous synonymy in the following manner: 1°. He knew that Linnæus had at a later period founded his description of *C. officinalis* on specimens which he received from Santa Fe; and 2°. he erroneously presupposed that all the Cinchona forests in the neighbourhood of Santa Fe, discovered by M. Mutis, consisted of white Cinchona, or *C. macrocarpa*.

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* Flor. Peruv. t. iii. p. 1. t. 224.

Linnæus united, as already observed, two quite different plants under the denomination of *C. officinalis*. The dried specimen of which he made use for establishing the diagnosis, was (as M. Mutis has repeatedly and orally assured me) yellow Cinchona, *C. cordifolia*, Mut., and the same species which Vahl calls *C. pubescens*, but of which one variety has entirely smooth leaves, *folia utrinque glabra*. Linnæus quotes as synonymous the species described by Condamine in the *Mem. de l'Academie*, 1738: he consequently united one species from Santa Fe with another which grows exclusively in the neighbourhood of Loxa.

Ruiz, in his *Quinologia*,[†] calls a species *C. officinalis*, which he afterwards describes in the *Flor. Peruv.* by the name of *C. nitida*. He maintained at the time, that this tree, which

[*] Act. Havn. I. p. 19. Lambert, p. 22.

[†] Cascarilla officinal. Quinolog. Arct. II. p. 56.

grows in the forests of Huamalies and Xauxa, consequently far from Loxa, between the 10th and 12th degree South lat., was the Cinchona described by La Condamine. In the *Supplemento a la Quinologia*, p. 68, a botanical disputation which appeared against M. Zea, Mutis, and Cavanilles, this assertion is very justly withdrawn. Indeed the *C. nitida* or *C. officinalis* Ruiz is no other than the Cascarilla naranjanda from Santa Fe, or *C. lancifolia* Mut.

Since therefore four different species, the *Cascarilla fina de Uritusinga*, which Condamine has figured, *C. pubescens* Vahl, *C. nitida* Ruiz, and *C. macrocarpa* Vahl, have already received the name of *C. officinalis*, we have called the Cinchona of Uritusinga, in commemoration of its first discoverer, *C. Condaminea*. It is true that M. Ruiz, in his *Supplemento a la Quinologia*, gives it as his opinion, that the plant called at present Cascarilla fina at Loxa, was not the plant described by the French astronomer; but not only the unanimous testimony of all inhabitants of Loxa, Caxanuma, and Uritusinga, speaks against this, but also Jussieu's *Hortus Siccus* at Paris. M. Bonpland has carefully compared our *C. Condaminea* with the specimens which were collected by Joseph de Jussieu and La Condamine. No doubt remained concerning the identity of the species.

The *C. Condaminea*, like *Myristica*, *Caryocar amygdaliferum*, and many precious products of the tropics, is confined to a very small space, and it has been hitherto most imperfectly described. No botanists, neither Ruiz and Pavon, nor Tafalla, nor Nee, nor Hänke, nor Mutis, have observed it before us at its place of growth. The following may be considered as imperfect figures of the *C. Condaminea*: Mem. de l'Acad. de 1738, p. 114.; Lamarck Encyclopédie, pl. 164. fig. 1.; Vahl Skrivt. af Naturh. Selfkabet I. tab. 1., and Lambert. Monogr.

tab. 1. The true character of the leaves has been missed every where; and it would be bold to quote these synonyms, if it were not possible to verify them by examining the specimens which have served for the drawings.

Our *C. Condaminea* grows under the 4th degree south latitude, on the mountainous declivity in the mean altitude between 900 and 1200 toises. It requires a milder climate than the orange-coloured Cinchona, *C. lancifolia* Mut., from Santa Fe. It is exposed to a mean temperature from 15 to 16 degrees Reaumur, which is about the mean warmth of the Canary Islands.

I here insert an exact diagnosis of the *C. Condaminea*, which I drew up at Gonzanama, and of which (as it remained buried beneath astronomical manuscripts) M. Bonpland could not avail himself in the publication of the second fasciculus of *Plantæ Æquinoctiales*.

Calyx tubulosus basi angustatus sub-5-gonus subhirsutus ore 5-dentato, dentibus ovatis acuminatis patentibus. *Cor.* hypocrateri-formis tubo cylindrico rubro lævissime hirto 5-gono (ad basin persæpe fisso) limbo 5-fido sæpissime 4-fido, laciniis ovatis acutis apice et margine ciliatis, vel tomentosis ciliis albis. *Faux* corollæ et totius tubi pars interior rubra glabra, nec ciliata. *Stamina* quinque, rarius tria et quatuor. In corollâ 4-fidâ sæpius stamina quinque numeravi. *Filamenta* ex rubro albescentia imo tubi adnata, cum eo cohærentia, tertiam tubi partem æquantia, eademque tantum tertiâ suæ longitudinis parte liberâ. *Antheræ* planæ lineares, parte liberâ filamenti duplo longiores. *Germen* rotundum subdepressum rubescens, sæpe punctatum et 5-sulcatum. *Stylus* fere longitudine tubi, crassus, teres. *Stigma* tubum vix superans, viridescens, compressum, bifidum sæpe bipartitum. *Capsula* calyce coronata, oblonga, flore tertiâ parte longior, bipartibilis, striato-costata, de medio hiscens, dissepimento parallelo. *Semina* plura compressa alâ membranaceâ crenulatâ cincta. *Rami* cicatrisati post casum foliorum, sub-4-goni; juniores glaberrimi, subpulverulenti. *Folia* petiolata decussatim opposita lanceolata acuta, integerrima, utrinque viridia, nullis venis rubris picta, fere laurina, glaberrima, in axillis nervorum infernè scrobiculata. *Glandulæ* nullis pilis obsitæ, convexitate in paginâ superiori folii conspicua, venas altitudine superantes. Pagina folii inferior scrobiculum demonstrat. *Petioli* sæpè rubescentes, supernè plani, infernè teretes. *Stipulæ* deciduæ, oblongæ, carinatæ. *Panicula* axillaris et terminalis, folio longior floribus brevè pedicellatis.

Size of the parts in a tree flowering for the first time :— Calyx, $1\frac{7}{10}$ lines long; corolla, $5\frac{4}{10}$ lines; capsule, 8 lines long, 3½ lines broad; according to Parisian measure. Full-grown leaves exclusive of the petioles, 4 inches 3 lines long, and 1 inch 9 lines broad. The young leaves frequently have a length of 5 inches, and the great breadth of 4 inches 7 lines.

The *C. Condaminea* varies amazingly in the leaves before the tree comes into flower. In the shoots and very young trees we frequently find folia latè ovata and ovato-lanceolata. The older the tree is, the narrower are its leaves. In great luxuriance of growth, the little grooves frequently vanish, which appear on the upper side of the leaf as convex glands. On very broad leaves, in which the parenchyma is considerably extended, they are almost entirely wanting. However, even then, we always meet with single folia scrobiculata upon the same branch.

2. *C. lancifolia foliis lanceolatis acutis utrinque glaberrimis.* Mutis, Period. de S. Fe, p. 465. (et Flor. Bogot. Mss.) In Santa Fe it is known by the names of Quina naranjanda, Quin-

quina orangé, or orange-coloured Bark. Next to *C. Condaminea*, it is the most efficacious febrifuge of all the kinds of Cinchona; the species which M. Mutis, in his *Quinologia*, calls the Quina primitiva directamente febrifuga, because he prefers it to the three following species, and because he thinks (what is erroneous, however) the fine Cinchona of Uritusinga is the same species as Quina naranjanda of New Granada. The *C. lancifolia* has smaller leaves than the others with tomentose corollas. They are also continually smooth, when on the contrary the place of growth produces, in the yellow and white Cinchonæ, varieties with hairy leaves.

The Quina naranjanda loves a rough climate. It grows between the 4th and 5th degree north lat. on mountainous declivities from 700 to 1500 toises high. The mean temperature of this place of growth is about equal with that of Rome. It amounts to 13° Reaumur; however the Cinchona trees ascending highest towards the summit of the mountains are mostly exposed to a temperature of from 8° to 9°. During the cold at nights, the thermometer falls in these alpine forests for hours as low as the freezing point; however, as far as 1500 toises high no snow falls in this latitude.

The Quina naranjanda, together with the *C. Condaminea*, belongs to the more scarce species. Nature herself has produced them in the kingdom of New Granada in a much smaller number than those of the yellow and red Cinchonæ, which latter ones form here and there almost closely-connected shrubberies. *C. lancifolia*, on the contrary, stands always single; and what is to be regretted in so valuable a produce is, that it does not increase so easily by shoots from the root, as the *C. cordifolia* and *C. oblongifolia*. In the Monographs of Vahl and Lambert, no mention is made of the species called Naranjanda of Santa Fe. An indisputable synonym on the contrary is *Cinchona angustifolia* Ruiz, *Suppl. à la Quinologia*, p. 21, where an excellent figure is given. It is indeed surprising, that so exact a botanist as M. Ruiz should change the old Mutisian name *C. lancifolia* for *C. angustifolia*, since that name has previously been given by Swartz* to an Island-Cinchona with a smooth corolla and long projecting stamens.

Professor Zea thinks, and, as it appears to me, with perfect propriety, that several species of the *Flora Peruviana* denote merely different states of the Quina naranjanda, such as depend on the age, the climate, and the place of growth. The following appear to be varieties of the *C. lancifolia* Mut.: 1°. *C. nitida Flor. Peruv. II. Icon. t.* 191. (Ruiz, *Quinol. II.* p. 56.) Ruiz's Cascarilla officinal. 2°. *C. lanceolata Flor. Per. II.* p. 51. and *C. glabra* Ruiz *Quin. II.* p. 64. Cascarilla lampina, of which no figure is given. M. Zea thinks he may venture to add to these, the *C. rosea Flor. Peruv. II. Ic.* 199. a species which is said to be the most scarce in Peru, and (what agrees little with the nature of C. *lancifolia*) to descend from the mountains into the lowest regions.†

The Cinchona Bark so famous in Cadiz by the name of Calisaya, and of such particular medicinal power, belongs, according to Mutis, indisputably to *C. lancifolia*. Ruiz considers it, in his *Quinologia*, as synonymous with his *C. glabra*. But in his disputation against Zea, he withdraws this opinion, and assures us that there is no species growing in the neighbourhood of Huanuco which produces a bark similar to the Calisaya.‡ The name Calisaya is that of the province producing this bark, which is situated in the most southerly of Peru, in the Intendencia de la Paz.

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* Flor. Ind. occ. I. p. 380. Lambert, p. 29. Pl. 9.

† Ruiz Supplem. à la Quinol. p. 54.

‡ P. 73 and 95.

The second edition of a modern French work, Alibert's *Traité de Fièvres intermittentes,* contains very exact figures of the orange-coloured Cinchona, as well as of the three following Mutisian species. They have been made from dried specimens, determined by M. Mutis, and supplied by M. Zea from his collection during his residence at Paris.*

3. *C. cordifolia fol. orbiculato-ovatis sæpe subcordatis subtus tomentosis supra pubescentibus,* Mut. Mss. Quina amarilla, Quinquina jaune, yellow Bark from Santa Fe, the species, as observed above, described by Linnæus in *Syst. Nat. t.* ii. *ed.* 12. p. 64. under the name of *C. officinalis.* The anthers in *C. cordifolia* and *C. lancifolia* reach as far as the upper parts of the flower-tube; when on the contrary, in the red Cinchona (*C. oblongifolia*) they are deeply hidden in the middle of the tube. *C. cordifolia* has two varieties. Var. *β foliis vix cordatis utrinque glabris. γ foliis utrinque hirsutis.* By the common people, in the kingdom of New Granada, it is called Velvet Bark. It grows under the 4th degree North latitude, in heights betwixt 900 and 1440 toises. Cordate leaves occur but seldom: however, almost every branch exhibits some of them. *C. cordifolia* Mut. is, according to Bonpland's examination, identical with *C. pubescens* Vahl, as proved by Jussieu's collection, from which Vahl received his specimen. Joseph Jussieu had collected, in 1738, this species of Cinchona and *C. Condaminea* in the forests of Loxa.

The *C. ovata Flor. Peruv. II. t.* 195. *Cascarilla pallida* Ruiz, *Quinol. Art.* 7. p. 74. called in the neighbourhood of

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* Some of these figures are evidently copied from those in *Flora Peruviana.*—Edit.

Pozuzo *Pata de Gualleratá*, is likewise a synonym of *C. cordifolia* Mut. Ruiz and Pavon themselves have latterly acknowledged this identity.*

The *C. hirsuta Flor. Peruv. II. Ic.* 192. Cascarillo delgado, or *C. tenuis* Ruiz, *Quinol. II.* p. 56. is, according to Zea, a variety of *C. cordifolia* Mut. Does *C. purpurea Flor. Per. II. t.* 193. or Cascarilla morado Ruiz, *Quinol. Art.* v. p. 67. also belong here? This species varies surprisingly in its leaves, and on one and the same tree too.

4. *C. oblongifolia foliis oblongis acuminatis glabris, filamentis brevissimis, antheris infra medium tubi latentibus.* Mut. Mss.

Quina roxa, Quinquina rouge de Santa Fe; differt a *C. lancifolia*, 1°. foliis latioribus, majoribus oblongis nec lanceolatis; 2°. antheris haud in summo tubi latentibus.

It grows under the 5th degree North lat. in heights from 600 to 1300 toises, and is particularly common in the neighbourhood of Mariquita, a small town, which was for a long time the seat of M. Mutis's botanical expedition. It frequently bears much larger fruit than the white Cinchona, *C. ovalifolia*, for which reason it would deserve the name of *macrocarpa* with more propriety than the latter one. Its bark is less efficacious than that of *C. Condaminea* and *C. lancifolia*, yet more so than the yellow Cinchona, (*C. cordifolia.*) It is more stimulating, for weak constitutions, in inflammatory diseases frequently dangerous, but the more beneficial when applied externally in diseases of the muscles, suppurating and sphacelous ulcers.

The yellow Cinchona, *Cascarilla amarilla Quinol. Art.* vi. p. 71. or *C. magnifolia Flor. Per. II. Ic.* 196. which, on account of the fragrant and orange-flower smell of its blossoms, is called in Peru, Flor. de Azahar, and in Popayan, Palo de requeson,* is, according to the latter confessions of Ruiz, identical with *C. oblongifolia* Mut. or with the red Cinchona of Santa Fe.

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* Supplem. à la Quinol. p. 18.

5. *C. ovalifolia fol. ellipticis supra glaberrimis subtus pubescentibus antheris in parte tubi superiori latentibus filamentis vix ullis.* Mut. Mss.

Quina blanca, Quinquina blanc: White Cinchona of Santa Fe.

Var. β. fol. utrinque pubescentibus.
γ. fol. utrinque lævibus.

Both varieties, particularly the first, have frequently a corolla with 6 or 7 divisions, and 6 or 7 stamens.

It grows under the 3d to the 6th degree North lat. in heights from betwixt 700 and 1400 toises. The variety with smooth leaves is frequent near San Martha. The *Cinchona macrocarpa* Vahl. (Lambert, p. 22. t. 3.) is a true synonym of this, acknowledged by Mutis and Ruiz themselves.† Amongst the Cinchonæ with hairy corollas it is the largest-flowering one of all. It must not, however, be confounded with *C. grandiflora Flor. Peruv. II. p.* 54. (*Cosmibuena obtusifolia Flor. Peruv. III. t.* 198.) having a quite smooth corolla.

6. *C. brasiliensis foliis oblongis acuminatis, venis subtus pubescentibus paniculâ terminali, tubo calycis longitudine.* Willd. Mss.

A very small-flowering species, for which we are indebted, as observed already, to Count Hoffmannsegg, together with Aublet's and Lambert's *C. longiflora* from French Guiana, the only Cinchona which grows on the easterly coast of the South American continent. Nothing decisive is known about the height of its place of growth; but as it has been sent from the neighbourhood of the town of Gran Para, at the mouth of the Amazon river, and as in this region there are only low hills found, we are allowed to suppose that *C. Brasiliensis* belongs to the hot regions.

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* Period. de Santa Fe, p. 335.

† Suppl. p. 18.

The character of this species by M. Willdenow, tube of the corolla the length of the calyx, distinguishes this Cinchona from every one hitherto described. Throat of the corollæ hairy; hairs few, short, appressed, situated on the interior surface of the corolline laciniæ.

7. *C. excelsa corollâ pubescente, filamentis e medio tubi nascentibus, antheris exsertis, foliis oblongis subtus pubescentibus.* Roxb. Plant. of the Coast of Coromandel, ii. t. 106.

The only Cinchona hitherto discovered on the continent of the ancient world, about whose medicinal use and its bitter no trials have however as yet been made. It has very small greenish-white flowers, and of all Cinchonæ the largest leaves, sometimes one foot long and five inches broad.

The *C. excelsa* (*Bundarvo* of the Felinga Indians) grows in the mountain chain of the Circars, which runs along the north-easterly coast of the great peninsula of Hindostan. Retzius[*] has at an earlier date, from accounts communicated to him by König, mentioned a Cinchona which grows in Malacca, opposite to the coast of Coromandel, and which produces the genuine *terra japonica*, called *Cotta Cambar*, a vegetable produce, which for a long time was erroneously ascribed to *Mimosa spicata* Pluk. Might not this Cinchona from Malacca be a different species from *C. excelsa?*

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[*] Observ. Bot. fasc. iv. p. 6.

B. *Cinchonæ corollis glaberrimis.*
a. *staminibus inclusis.*

8. *C. grandiflora, tubo corollæ longissimo, fol. lanceolato-oblongis utrinque glabris.*

I have retained the former name of the *Flor. Per.* M. Ruiz calls this species at present *Cosmibuena obtusifolia.* (*Flor. Per.* vol. iii.) It is identical with *C. longiflora* Mut., a name which would cause confusion, since Lambert enumerates as *C. longiflora* the Island-Cinchona staminibus longe exsertis, described as *C. Caribæa* in *Journ. de Phys.* Oct. 1790.

It is fond of warm regions, and descends from the mountains in heights from two and three hundred toises. It grows in regions whose mean temperature is from 18 to 19 degrees.

9. *C. parviflora foliis ovatis glabris, filamentis basi dilatatis et pubescentibus.* Mut. Mss.

It has the smallest fruit of all Cinchonæ.

b. *staminibus exsertis.*

10. *C. dissimiliflora foliis cordato-oblongis glaberrimis, limbo corollæ tubo longiori, capsulis sublinearibus angustissimis.* Mut. Mss.

Next to *C. longiflora* Lamb. the only species of the continent which has stamina exserta. Grows in heights betwixt 200 and 700 toises in warm regions.

11. *C. Caribæa* Swartz.
12. *C. longiflora* Lamb.
13. *C. lineata* Vahl.
14. *C. floribunda* Swartz.

15. *C. angustifolia* Swartz.
16. *C. brachycarpa* Vahl.

These six latter species grow all in the West-India Islands, and love a temperature of from 17 to 22 degrees R.

17. *C. corymbifera* Forster.

Native of the Friendly Islands.

18. *C. Philippica,* discovered near Manilla by Nec.

I do not venture to assert that all Cinchonæ hitherto known are comprehended within the eighteen species arranged here. I have merely wished to enumerate those which are known to me, partly in their natural state partly from good figures, and which to me appear indisputably specific from each other. *C. acutifolia, C. micrantha, C. glandulifera, C. dichotoma, C. (Cosmibuena) acuminata,* and *C. spinosa,* deserve a closer investigation. The genus might perhaps increase to twenty-four species.

MEMOIR

ON THE

DIFFERENT SPECIES OF QUINQUINA.

BY M. LAUBERT,

CHIEF PHYSICIAN TO THE SPANISH ARMY.

BOTANISTS recognise about twenty Barks of the genus *Cinchona,* but the number of those which are current in commerce is much more considerable.

They are vended singly, or mixed with each other, under the names of *Cascarilla de Loxa,** *Calisaya, Red Cascarilla,* and *Huanuco.*

CASCARILLA DE LOXA.

Under this name are included all the most esteemed and select Quinquinas of the province of Loxa. Five species of it are known; the *yellow*, the *red*, the *Peruvian*, the *thin*, and the *furred (lampina)*. The two first have always obtained a preference in His Majesty's pharmacy, and have been reserved for the packets destined for foreign powers. The Peruvian is the next in estimation; but we must not confound this species of Loxa with the Peruvian bark of commerce, which is rarely found unadulterated, and which almost invariably contains Barks of inferior quality. Lastly, the thin and the furred are also in great request, and almost as much esteemed as the Peruvian. M. Ruiz has given a description of the three latter in his *Quinologia*,* and has defined its botanic characters.

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* The word *Quinquina* is not used in Peru, and is rarely employed in Spain among traders; they adopt the term *Cascarilla,* and those who gather the barks are called *Cascarilleras.* The *Croton chacarilla* of Linnæus is known in Peru by the name of *Chacarilla.* It appears that the term *Quinquina,* as M. de Condamine has observed, has been taken from the febrifuge employed before the discovery of this bark, particularly by the Jesuits; it was the *Myroxylon peruiferum,* called in Peru *Quinoquinos* and *Quinoquina.* This conjecture is the more probable, because the *Quinquina* at first was known also by the name of Jesuit's Powder, and the genus *Myroxylon peruiferum* has not been well determined and described until the present day.

We may just observe that M. Ruiz thinks the *Myrospermum* and the *Toluifera* ought to be comprehended under the generic term *Myroxylon.*

To these five species may be added the *lizard-shaped Cascarilla*, less valued indeed, and unknown to botanists, but regarded by them and in commerce as one of the fine Quinquinas of this province.

The botanists of the expedition to Peru† believe that the finest species of Loxa have been longest known and used in medicine;

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* A description of three of these species is to be found in the *Quinologia* of M. Ruiz.

This work appeared in 1792; it treats of the discovery of *Quinquina;* of its qualities, of the trade in it, and of its value in the different provinces of Peru, which in his time amounted to more than 250,000 livres yearly; of the places which produce the finer sorts; of the gathering, desiccation, and transport of the barks; of the method practised in Peru for preparing the extract of fresh barks, &c. He then gives the generic characters of the *Quinquina*, with a description of seven species, the characteristic qualities of the red *Quinquina*, of the Calisaya, of the *Quinquina* with olive leaves. In the *Supplement*, which appeared in 1801, under the names of Messrs. Ruiz and Pavon, those learned botanists gave a description of four new species discovered by Tafalla; the qualities of the bark known by the name of *Huanuco*, and of the *C. laccifera;* the description of the *C. angustifolia*, which appears to be of the same species with the *lancifolia* of Mutis; an answer to a Memoir of M. Zea, on the *Quinquinas* of Mutis or of Santa Fe; and lastly, a Letter to M. Jussieu in answer to some observations of that learned botanist on the *genera*, announced in the Prodromus of the *Flora Peruviana*.

† The expedition to Peru took place in 1777; it lasted eleven years. Messrs. Ruiz and Pavon were appointed to this expedition as botanists. They were powerfully seconded in their researches by M. Dombey, a French physician and naturalist of rare merit. When the mem-

they found their opinion particularly on the preference which they have always held in the royal pharmacy, and on the tradition of the inhabitants of that kingdom, where the febrifuge quality of the Quinquina was first proved.*

This is not the opinion of M. Zea and the botanists of the expedition to Santa Fe.† They regard the C. *lancifolia* of Mutis as the most ancient, and designate it by the epithet of primitive; according to them, this Quinquina should also seem the most efficacious in intermittent fevers.

I. CASCARILLA AMARILLA (YELLOW).

THIS Quinquina, known also in Peru by the name of *Cascarilla de Loxa,* is the genuine Cinchona of Ruiz.‡ The tree to which it belongs grows in the provinces of Loxa, Cuença, Jaen de Bracamoros, and others.§

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bers of the expedition quitted America, M. Tafalla was intrusted by them with the continuance of their botanical labours and researches. This gentleman, aided by M. Menzanilla, has enriched botany with several interesting discoveries, and has greatly augmented the family of the Quinquinas.

* It is well known that the generic term was taken by Linnæus from the title of the viceroy of Peru, Don Geronimo Fernandez de Cabrera Count Chinchon. The Viceroy ordered proof to be made of the febrifuge qualities of the Quinquina before he administered it to his lady, and greatly contributed to make its efficacy known.

† Don Joseph Celestino Mutis went to New Granada in 1760, and in 1780 he was appointed director of the botanic expedition of Santa Fe, which commenced its labours in 1784; his associates were Messrs. Valenzuela, Laudat, and Cambler. To these botanists we owe a valuable collection of materials. M. Mutis published in the periodical journals of Santa Fe his medical observations on the four Quinquinas, designated by him under the terms orange-coloured, red, yellow, and white, and which he says he discovered. It is known that M. Lopez Ruiz disputes with him the discovery of the two former.

‡ M. Ruiz thinks that Linnæus should have employed the word Chinchona instead of *Cinchona,* which does not denote the real title of the Viceroy of Peru.

§ The *Quinquina de Loxa* used in the royal pharmacy was procured latterly from the mountains of Urituzinga, Guatizinga, and Caxanuma; practitioners having found by experience that

This bark is slender, about the size of a goose-quill, pretty well rolled,* and covered with a slight thin epidermis of a fallow grey. Its internal surface has the fineness and aspect of Ceylon cinnamon; its fracture is very clear, except on the inner side, which presents little fibrous filaments, extremely fine; its

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it is preferable to that gathered at Quito, Jaen de Bracamoros, Cuença, and other places. D. Vicente Olmedo, a distinguished botanist, was appointed by the King to superintend the collection and desiccation of this precious bark.

* The thickness, fineness, and roundness of the barks must be taken into consideration when a good choice is to be made. It is necessary to ascertain not only whether a bark be of a good quality, but whether it has been well dried and preserved, whether it has belonged to an old branch or to too young a branch, &c. and these three characters may be useful in influencing our choice. The following are some general ideas on the inferences deducible from them.

The barks more than an inch and a half in width must proceed from the trunk or the great branches; time and parasites may have altered these barks, and particular attention must be paid to the state in which they are found. Those which are not so thick as a quill, must have belonged to branches still too young, which may not have acquired a suitable degree of maturity, according to the language of the Cascarilleras.

The same observations are applicable to a bark which is too thin or too thick; but in order to judge well of its thinness or thickness, regard must always be had to the species to which the bark belongs.

As to the rolling or roundness, it is well known that the barks are separated from the branches in longitudinal slips by means of a very fine knife. They roll themselves up, because the internal surface being more fibrous, and charged with more humidity, must shrink more considerably than the external surface. Their being well rolled is a proof that they have belonged to very ripe branches; that is to say, neither too old nor too young, and that they have been carefully dried. A feeble rolling can accord only with old barks, or those which have been too slowly dried. Lastly, when the bark is too much twisted, and forms as it were a spiral of a turn and a half or thereabouts, it may be supposed to have been dried too suddenly, or to have been gathered before the period of maturity.

The Cascarilleras decide in the following manner on the maturity of the barks. They begin by extracting from each branch a strip of bark; if after its extraction it begins to redden on the inner side, this is an infallible proof, according to them, that it has arrived at maturity; but if after three or four minutes this colour is not manifested, they reject it as not in season. *The Cascarilleras affect to distinguish the barks which have not attained the proper degree of ripeness, by the feeble colour of the inner surface, the less aromatic smell, the less agreeable taste, the easier fracture, and the less consistent texture.*

smell, which is considerably aromatic, becomes perceptible on pulverization or decoction; its bitterness is successively developed by a prolonged mastication, but it is always very inferior to that of the Calisaya; it is also styptic, but without acerbity. This Bark is rarely found without mixture: on its external surface are to be observed some slight transversal and almost parallel fissures.*

II. RED CASCARILLA.

THIS is the name which this Bark bears in Peru; it is more common than the former, and is found in greater quantity among the barks used in the royal pharmacy.†

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* It is astonishing that the botanic characters of this species have not yet been published, and that M. Ruiz has not given a description of its bark in his *Quinologia*. M. Pavon having had the politeness to shew us a drawing of this tree, carefully made under the inspection of M. Tafalla, and which will be published in the fourth volume of the *Flora Peruviana*; we have the pleasure of indicating the most prominent specific characters which we have remarked on this plate. *Cascarilla amarilla del rey*, or *Royal yellow Quinquina*, is the name which it bears in the drawing; *foliis lanceolatis glandulosis obscurè virescentibus, petiolo nervoque centrali sanguineis, flore rubro.* M. Pavon has informed us that this bark detaches easily from the wood, and that the most experienced barkers distinguish it by this separative character. Some days after the extraction it is not to be distinguished from that of No. 2; when it is fresh gathered the colour of the internal surface is of a greenish white, which soon changes into a faint yellow, augmenting in intensity until the desiccation is complete. The tree or shrub which produces it is of the same height and exhibits the same structure as that of the red; yet M. Tafalla designates them in his drawings as forming two different species.

† M. Pavon having had the politeness to shew us the drawing of this shrub, we have recognised in it the following characteristics: *C. foliis lanceolatis glandulosis, petiolo nervoque centrali sanguineis, flore rubescente.* The two drawings appeared to us so similar that we found only a slight difference in the colour of the flower, and were unable to discern on what character their specific difference could be established.

At the moment of extraction this bark assumes internally the colour of saffron, though rather livid; during desiccation its colour heightens, and approaches more or less to that of Ceylon Cinnamon. The shrub grows to the height of about three yards. The trunk is generally single, and covered with a rather rough bark. M. Pavon has informed us that this bark adheres more to the wood than the former; but it is more compact, and emits some little noise when detached from the wood.

We have remarked in it the following characters: the epidermis thin, but rather thicker than that of the yellow; wrinkled, of a chesnut brown, and covered with silvery flakes and very small lichens; transversal fissures more numerous and very distinct; thickness somewhat less than a line; roundness or rolling complete; fracture clear, with little filaments in the internal part; thickness the same as the former; internal surface not so fine, and of a greyish yellow; no perceptible difference from the former in the other qualities. It is often found in commerce with the Peruvian, the slender, the rough, and others, but forms, together with the first, the assortment most in esteem.

III. THE PERUVIANA.

This is the bark of the ***Cascarillo officinalis*** of Ruiz, ***Cinchona nitida Flor. Peruv.****[*] ***C. officinalis*** of Linnæus, much esteemed, and distinguished by the following characteristics: Fissures orbicular and parallel; surface slightly rough; of a clear grey, on account of the silvery lichens which almost entirely cover it;[†] the parts not covered by lichens are of a chesnut colour; in thickness from half a line to a line; size from a goose-quill to an inch and a half, according to M. Ruiz; the rolling complete; internal surface of a yellowish red, approximating to common Cinnamon; fracture clear, with very few fibres in the internal part. It is in general thicker and more compact than the two former; its bitterness appears rather fainter, but its smell much more perceptible. M. Ruiz regards this bark as the richest in quinic acid, and least disagreeable to sick persons.

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[*] *Foliis obovatis nitidis, paniculâ brachiatâ, corollis albo-purpureis, limbo parum hirsuto.* The natives of the country call the trees of this species *Cascarillos finos.* It is the *Quinquina* which was first discovered in the province of Loxa; is much esteemed, and one of those most in request. The tree grows in the mountains of Panatahuas, Huanuca, Xauxa, Loxa, &c.; it flowers generally in the months of May, June, and July, and grows to the height of ten or fifteen yards.

[†] From this circumstance it doubtless derives its name of *Quinacana*, by which it is also known by the inhabitants, to distinguish it from other barks which might be of the same colour.

We have already observed, that this bark must not be confounded with the *Peruvian* of commerce, the goodness of which depends on the quality of the species of which it is composed.*

IV. THE SLENDER (DELGADA).

THE bark known by the term *delgada* or *delgadilla,* belongs to the *C. hirsuta Flor. Peruv.*† Its external surface is rather rough, with small transversal clefts, and is of a clear grey, from the whitish lichens, less silvery than those of the *C. nitida,* by which it is mostly covered. The parts destitute of this covering exhibit a rusty colour, especially when viewed through a good lens; it is remarkable for its fineness, being nearly half a line in thickness and two or three lines in diameter, the fracture clear and resinous, with some extremely small filaments in the internal part; it is well rolled, and has much affinity with the former in bitterness and aroma. It is generally found mixed with other fine species, but is very rare.[*]

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* We have never been able exactly to ascertain what is the *Peruvian bark* of commerce. We have applied to all the druggists in the capital, and can affirm that all the *Quinquinas* they have shewn us have little resemblance to each other. It is even to be found of different qualities at the same druggists. We have often met with thick barks of the good species of Loxa, some smaller barks of the same species, and a great quantity of inferior species.

† *Foliis ovalibus, crassis, margine reflexis, terminalibus, subcordatis, floribus corymbosis; ollis purpurascentibus tomentosis, limbo hirsuto.*

This tree grows to the height of about five yards. Having attained its developement, it becomes surrounded with shoots springing in a vertical direction from its root, and forming with the principal trunk an oval surface with the appearance of a dome. It grows in the mountains of Pillao, Acomayo, and other places of Panatahuas.

V. THE LAMPIÑA.[†]

THIS is the name given by Ruiz to the ***Cascarilla bobo***[‡] of Peru, or to the bark of the ***C. lanceolata, Flor. Peruv.***[‖] It is distinguishable by its thickness, from one line to two, according to its bulk, which varies from that of a goose-quill to an inch and a half; it is well rolled, and slightly rough on its external surface; the epidermis very fine, and cracked; of a sallow colour, with spots more or less bright or dark, proceeding from some farinaceous lichens; the internal surface rather rough and of a pale red; the fracture clear and easy in every direction. This bark is readily discerned when mixed with the former, not only by its colour and thickness, but also by its bitterness, which is much more considerable, and approximates to that of the Calisaya;[§] its smell is not very perceptible. It occurs very commonly in the Peruvian of commerce.

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[*] The cause of the rarity of this bark is its extreme fineness. The Cascarilleros have little interest in procuring it, as a day labourer within the same period might obtain eight times more in quantity of *Peruvian* than of the *Delgadilla.*

[†] The word *lampiña* may be rendered by that of *glabra* used in the same sense by botanists.

[‡] The word *bobo* is equivalent to that of *fool* or *booby*. The inhabitants have given it this name because, having the same good qualities as the other *Quinquinas*, it has not their colour. The tree flowers in the months of May, June, and July, and grows generally to the height of ten yards; its habitats are the woods of Cuchero, Pillao, &c. Its bark is received in commerce when mingled with that of the *Delgada* and the *Peruvian*. It is also known by the name of *Cascarilla amarilla de muño.*

[‖] *Foliis lanceolato-oblongis glabris, paniculâ brachiatâ magnâ, floribus sub-corymbòsis, corollis roseo-purpureis: limbo hirsuto.*

[§] M. Ruiz formerly thought that the *Calisaya* was only the internal bark of the *C. lanceolata*, perhaps on account of their resemblance in thickness, bitterness, and other characte-

VI. LAGATIJADA (LIZARD-COLOURED).

THE species to which this bark belongs is not known, and M. Ruiz has not mentioned it in his *Quinologia*. Yet he has given us specimens[*] by which to recognise it, and he regards it, with those who trade in it, as one of the species peculiar to the province of Loxa. We have compared it with the preceding species, and have found that the Yellow is that with which it has most affinity by the fineness of its epidermis, its size, its thickness, and its colour, as well as its bitterness and smell; but the internal surface is of a less lively colour, and has less of the velvet tact; its fracture is entirely ligneous. If this bark is to form a separate species, it will be easily distinguished from the other species of Loxa, and particularly from the Yellow, by this striking characteristic, and by the colour of its epidermis. In the *common Loxa* which some druggists have shown us, we have found a considerable quantity of this bark.[†]

Such are the *Quinquinas* which are sold singly or mixed, under the name of *Loxa*, and which are at the same time the most es-

ristics: but the great difference observable in the thickness of the epidermis of these two barks must render the identity of the species very doubtful. It appears that the botanists of Peru now agree in regarding these two barks as belonging to two different species; and M. Ruiz is of the same opinion.

[*] When we undertook to describe the *Quinquina* of commerce, we were aware of the difficulty, or rather the impossibility, of establishing the distinctive characters of the species according to their barks. M. Ruiz, to whom we communicated our project, has had the goodness to give us samples of all the barks which in his opinion belong to the species of the genus *Cinchona*, with the names given by the natives to each species, and those of commerce, as well as his opinion on their febrifuge qualities. We have also consulted his *Quinologia* for all the species of which this learned botanist has given a description.

[†] The chests sent to us from America, instead of a single species of *Quinquina* which each ought to contain, are filled with two, three, and often a greater number of different barks. This abuse has augmented in proportion as good barks have diminished, and as discoveries have been made of new or pretended new species.

teemed and in greatest request. We have observed that the *Delgada* is very rare, and that the two last species, which are reputed to be of an inferior quality, are easily distinguished; that of No. 5 by the size and bitterness of its bark, and that of No. 6 by its entirely fibrous fracture. Hence it results that the fine Quinquina of Loxa is reduced to one of the three first species, or to a certain mixture of their barks, and that it may be designated by the following characteristics: Size, that of a goose-quill, or nearly; thickness less than a line; surface slightly rough and a little wrinkled with or without circular fissures; the epidermis fine, of a sallow colour more or less dark, spotted with lichens or mucors of a silvery or greyish hue; internal surface smooth or velvety, of the colour of ochre bordering on yellow or red; the rolling perfect, the fracture clear, with some little filaments on the internal part only; taste bitter, rather aromatic, and styptic, without being disagreeable or nauseous, the bitterness manifesting itself gradually on mastication; the smell, that which is peculiar to good Quinquinas.

M. Zea thinks that a good distinction may be deduced from the heightening of the colour when the barks are moistened; but no one can be ignorant that all dry vegetables are heightened in colour when moistened, and we are of opinion that no useful deduction can be made from a quality common to all vegetables.

We shall specify the chemical qualities of each bark when we state our analyses.*

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* We may just observe by the way, that M. Zea believes that the authors of the *Flora Peruviana* have done wrong in making four species of two varieties of the *C. cordifolia* of Mutis. The *C. hirsuta* and *ovata* would form, according to him, one of the two varieties, and the *C. purpurea* and *micrantha* the other; it is only necessary to read the descriptions of Messrs. Ruiz and Pavon to see that M. Zea's supposition is groundless.

CALISAYA.

THE species to which this bark belongs is unknown in Spain. It is merely presumed that M. Bezares, a botanist attached to the expedition of Peru, discovered the trees of it in the mountains of Monzon, but the descriptions and the samples have not yet arrived. We have observed that M. Ruiz says in his *Quinologia*, that the Calisaya might be only the bark of the *C. lanceolata*, or *lampiña*, stripped of its epidermis ; he has reverted to this opinion after the notes which he has received from his successors in America. M. Zea, who finds everywhere the Quinquina of Santa Fe, pretends that it is no other than a mixture of the orange-coloured and yellow of Mutis.* This is not the opinion of the botanists of Peru, who regard the Calisaya and the orange-coloured as species entirely distinct.

We shall not enter into the discussions of these learned gentlemen. It is not for us to pronounce on the botanical definitions of the species circulating in commerce; our object is to describe them, and to collect, with regard to arrangement, the opinions of those who have a right to give them in consequence of their long botanical excursions on the mountains where the Quinquinas grow.

As the Calisaya is sold in commerce under three different names, and as the three barks, which appear to us to possess different characters, belong, according to the opinion of Ruiz, to presenting a very smooth surface. Its fracture is very unequal, with long fibres extending into both the pieces separated, and which are more distinct in the inner part; it is also less compact than the former, particularly in the interior. When it is pounded, a very fine, fibrous, and subtle powder separates from it, which penetrates the pores of the skin almost in the same manner as the fibres of the *Dolichas pruriens*. Under the pestle it yields a faintly-yellow powder, abounding in small fibres.* The genuine Calisaya is much esteemed; it is administered alone, and produces good effects. Practitioners say that mixed with the Quinquina in the proportion of one part to three, it produces much more certain results. In this manner it was latterly employed in the royal pharmacy.

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* It is really extraordinary that, while the enthusiasts of Mutis regard the orange-coloured Quinquina of Santa Fe as extremely rare, they meet with it in a great number of common barks ; they tell us, on the one hand, that scarcely in a thousand trees of Quinquina is to be seen one of this species, and then they find it in every direction. May not this contrariety be the result of a little ill humour among some of the members of the two expeditions ?

III. *Calisaya of Santa Fe.*

The name of *Calisaya de Santa Fe* has been given to the thick barks of a yellow Quinquina of that kingdom, very inferior in quality to the Calisayas of Quito and La Paz. It occurs in commerce mixed with the barks of the orange-coloured Quinquina, and of two other yellow Quinquinas of the

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sary to leave all the intermediate stripes, which in the sequel of the operation are deprived of a part of their epidermis towards the edges. By these means a considerable portion of the bark remains attached to the branch, and is rejected as useless. This loss is the more to be regretted, because it is almost certain that the epidermis has no influence on the febrifuge qualities of the Quinquina.

The epidermis of the *Calisaya* is thick, rough, and of a reddish brown covered with whitish lichens; its fracture is clear and resinous; it is easily reducible to powder, which is of a deep red, presenting no fibres and having no taste. The facility with which it separates from the rest of the bark will allow an exact analysis of it to be made. It is little esteemed, and for this reason the barks are stripped of it.

* This bark is very pliant, and the fibres resulting from its separation render its perfect pulverization by the mortar very difficult; it is much better operated on by the mill.

same place. It is known by its yellowish colour, and especially by the facility with which it is bruised, or, as we may say, pulverized, between the fingers. Its fracture is quite ligneous, and discloses in the interior a whitish fibre, whilst in good Calisaya this circumstance is scarcely perceptible.

The bitterness of the Calisaya is developed almost instantaneously and in all its intensity, whilst in the Quinquinas of Loxa the bark requires to be chewed and macerated in the mouth. This bitterness continues long after mastication, and is accompanied with a certain disagreeable taste which excites nausea. The rolled Calisaya is less disagreeable, though not less bitter, and appears to us to have a little smell.

IV. *Quinquina resembling the Calisaya.*

M. Tafalla has sent from Peru some specimens of a new Quinquina. Under this denomination, and under that of *Cascarilla provinciana,* he collected this bark in the woods of Chicoplaya. The same species also occurs in the mountains of Monzon, which belong to the province of the Huamalies, and the discovery of it is to be ascribed to M. Bezarés.* This bark has a perfect resemblance to the orange-coloured Quinquina of Mutis, and Messrs. Zea and Ruiz are rather inclined to believe that they may belong to the same species.

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* It is said that M. Bezares discovered at Monzon this species of Calisaya; it is also said that he discovered at Monzon a Quinquina similar to the Calisaya, and which is thought to be of the same species with the Red Quinquina of Mutis. It is possible that in the discovery of the Calisaya, which is ascribed to Bezares, the question may be only on the discovery of this new Quinquina resembling the Calisaya, which, according to M. Ruiz, is very different from the Calisaya, as well as the orange-coloured Quinquina of Mutis. This doubt can be cleared up, only by the arrival of the specimens which M. Tafalla is to send.

CASCARILLA ROXA (RED QUINQUINA).

It is supposed that this species was discovered in 1785 or 1786 at Riobamba, Cuença, and Jaen.

This Quinquina, more known in France than here, circulates very little in the interior commerce of Spain; it is used by only a very small number of practitioners. When it arrived from Lima for the first time at Cadiz, the dealers of the latter place paid little regard to it, and it was purchased by the English, and sent to England. Sir Joseph Banks wrote some time afterwards to Professor Ortega, to apprize him of the good results obtained from it, and to request some information on this new bark. Several known species are comprised under this name.

I. *Genuine red Cascarilla.*

This is the red Cascarilla of Ruiz, the red Quinquina of the French and English, the vermilion Quinquina of the Portugueze. It grows, as we have stated, in the mountains of Riobamba, Cuença, and Jaen, on very elevated spots, cool at night, and well exposed to the sun, as do all the other fine species. Its exterior surface is rough and furrowed with very distinct transversal fissures;* the epidermis of a sallow colour more or less dark, with whitish spots produced by lichens and mucors; the internal surface dark red; the thickness one or two lines; the bulk from one inch to two inches and a half; the small barks are well rolled, the large ones little or not at all; these three last characteristics of the Calisaya have much analogy with those of the rolled Calisaya and of the Calisaya de Plancha: the fracture of the smaller barks is clear, that of the larger somewhat fibrous, particularly in the interior; the smell agreeable, like that of the fine Quinquinas, and very perceptible on pulverization or decoction; the taste sufficiently bitter, aromatic, styptic, without being nauseous. The species is unknown.

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* The inspection of the plates sent by M. Tafalla to Messrs. Ruiz and Pavon, proves that the principal transversal fissures are owing to the insertion of the leaves and stipulæ; their proximity might form one of the characteristics for distinguishing the young shoots.

III. ***Cascarilla of flowers of Azahar,*** (orange flowers,) ***Cascarilla amarilla*** of Ruiz, ***C. magnifolia*** Flor. Per., ***oblongifolia*** Mutis.*

The exterior surface smooth and covered with mucors, which give it an aspect much like the bark of the poplar; the internal surface reddish, but internally it assumes a stronger tint in proportion as the parts approach the epidermis; the thickness is of a line or somewhat more; the bulk from that of a goose-quill to an inch and a half; the rolling of the small barks entire, that of the large ones nearly so; fracture unequal, with not very long fibres on either part; smell agreeable, and perceptible only on mastication or decoction; the taste an agreeable bitter, and rather styptic; not very compact. This Quinquina, little or not at all used by Spanish practitioners, is sent abroad, and particularly to northern countries; it is probable that the epidermis is separated, which hinders its sale on account of its colour. An extract is obtained from it which is in considerable repute, and much used in putrid fevers.

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* *Foliis oblongis ovalibus glabris, paniculâ brachiatâ, floribus sub-corymbosis, corollis albis: limbo villoso.*

This tree is one of the largest of the species. Its largest leaves are a foot long, and more than half a foot broad; the surface of the barks is always smooth; it grows in the mountains of Panatahuas towards Cuchero, Chinchao, Chacahuassi, and Puruzu; in well-sheltered and low situations. This species is found also in Santa Fe, and is designated by the natives by the name of *Azahar;* it was denominated by Mutis C. *oblongifolia.* In 1778 M. Ortega sent some specimens of it to the Royal Society of Medicine at Paris.

III. *Red Cascarilla of Santa Fe.*

M. Ruiz has transmitted to us a sample under the peculiar name of Red Quinquina of Santa Fe, and which he does not confound with the former. Its colour partakes rather more of the tawny, its fracture is cleaner on the exterior edge, and with long fibres on the interior. Its taste has something disagreeable, which is not perceptible in the former.

IV. *Cinchona laccifera* of Tafalla, vulgò *Socchi.*[*]

M. Tafalla, who discovered this species, sent the barks of it to Europe in 1798; they are the highest in colour of all those that circulate under the name of Red Quinquina. This new Quinquina is more in repute in respect to its febrifuge qualities; Ruiz places it among the inferior barks.

A thick spongy bark; the external surface rough with annular fissures more or less approximated; the epidermis very slender, of a tawny ash colour of different shades, the internal surface darker, of a colour resembling carmine or lake; the interior of the bark tawny, resembling rhubarb; thickness from two to four lines; specific gravity considerable notwithstanding its spongy appearance; fracture resinous on the exterior, bordered with small slender points on the interior; the odour of Quinquina extremely faint; flavour slightly bitter, and styptic without being nauseous. It is very little rolled.

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[*] This tree grows in the lower woods and in the valleys of Chicoplaya. Its bark is known by the inhabitants under the denomination of *Socchi.* The extract obtained from it is of a high colour and transparent. M. Tafalla says, that on scraping the internal surface of the fresh barks a juice is obtained, which inspissated in the sun serves as a substitute for lake. A specimen of this inspissated juice has been sent from Lima to M. Ruiz, by Father Gonzales, under the name of *Laca Cinchonica.* It is conjectured that the tree may belong to a new genus, between *Macronemun* and *Portlandia,* and materials are expected from M. Tafalla which will decide this question.

V. *Cascarilla del Rey* (Royal Cascarilla).

The species to which this bark belongs, which is sold also under the name of red Quinquina, is still unknown. We shall give a description of it according to the specimens of M. Ruiz; he does not speak of it in his *Quinologia*. This bark, like the preceding ones, occurs in large and small pieces, the latter well rolled, the others only half, both pretty fine; none are found exceeding a line in thickness. Its epidermis is also very fine, tawny, greyish and smooth; internal surface ochrey inclining to red; its fracture clear, with a few fibres towards the interior edge; its flavour styptic, and more disagreeable than bitter, with little or none of the aromatic odour peculiar to good Quinquinas. This bark presents on the internal surface almost the appearance of genuine red Quinquina; but externally it resembles the bark of the cherry-tree.

The genuine red Quinquina is readily distinguished from the other false or real Quinquinas that are sold under the same name. The second, third, and fifth, have an extremely smooth surface; the epidermis greyish; and there is not that uniformity of colour in the internal parts which is observed in the red Quinquina, which scarcely, even in the thick barks, presents a greyish shade. All these Quinquinas, moreover, either have the taste and smell of the first in a faint degree, or have a nauseous flavour. As to the bark of the *C. laccifera*, it is so thick, and its colour so striking, that it cannot be in any way confounded with the *roxa verdadera Huanuco.**

The Quinquina to which the name of *Huanuco* has been given, was first known in Spain in 1799, and was brought by the frigate La Vilez, which landed 180 chests of it at Santander. M. Ruiz, who was appointed to examine this cargo, found in the chests a thick bark, till then unknown to the botanists of Peru, mingled with the barks of the *C. nitida* and the *C. lanceolata*, and with those of the species which Tafalla has designated by the term *similar to Calisaya.* He cóncluded from this mixture, that the *Huanuco* must be regarded as a new Peruvian species, and that, united with other barks in certain proportions, it might compose a powder of middling quality. The subsequent missions were not so carefully attended to; for M. Ruiz discovered in them a quantity of barks of inferior estimation to the former. On all these barks we are about to treat, commencing with that which has been particularly designated *Huanuco.*

I. *Large Bark, designated particularly by the name of* HUANUCO.

The surface very rough, with transversal fissures near each other; some lichens; epidermis pretty slender, blackish, and almost tasteless; it separates easily from the bark in small scales;

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* The quantity of Quinquina òbtained annually from Peru, or which is wasted by the bad method of extracting the bárk; the custom of felling trees without providing a substitution of them, instead of stripping them in part and profiting by new shoots:—these constitute the principal cause of the scarcity of the fine species, and of the introduction of a great number of new species which the Cascarilleros think proper to introduce, without having any idea of botany, and in the mere routine of their station, frequently even in subservience to their interests. It is the principle of commerce to turn all to advantage, and we are inundated

the internal surface has a fibrous appearance, of a yellow colour sometimes light and sometimes deep, occasionally reddish; thickness from half a line to a line and a half; bulk from half an inch to three in circumference; odour that of the good Quinquinas but very slight; bitterness inferior to that of the Calisaya, somewhat styptic and nauseous; fracture considerably clean on the exterior edges of the two pieces; but entirely ligneous within. This bark is tolerably well rolled, sometimes the two sides roll separately and unite in the middle. It is thought that the materials and observations expected from M. Tafalla may afford means for determining this species.

II. *Cascarilla ferruginea* (iron-coloured).

Well characterized by the name which it bears in commerce, having internally and externally the colour of ochre; this colour is more or less lively in the internal parts of the bark. The external surface rough and more than wrinkled; the epidermis tawny, slender, adhering very well to the bark, and filled with numerous transversal clefts; internal surface ligneous; fracture very clear towards the exterior edges, but very ligneous internally; it breaks with difficulty, and is with difficulty bruised between the teeth. In its other characters it resembles the slender barks of Huanuco, but is less bitter and more nauseous. The species to which it belongs is still unknown. The *Huanuco* of commerce is mostly composed of this bark.

with unknown barks and mixtures, which render distinction almost impossible. Of all the mixtures, the least in consideration is that generally found under the name of *Huanuco*. It has sometimes portions of good species, the barks of the *C. nitida* and *lanceolata*, as M. Ruiz and others have remarked in the expedition of Santander in 1799; but most frequently the chests contain only barks in little repute, and almost the very refuse of commerce.

III. *Cascarilla claro-amarilla, or Quinquina of a clear yellow.*

This bark, of which the species is unknown, greatly resembles the orange-coloured Quinquina of Mutis. The epidermis is thin, covered with some whitish lichens, and easily separable from the rest of the bark; the colour yellow slightly partaking of red; it is of a faint bitter and considerably styptic without being nauseous: in its other characters it resembles the Calisaya; but is easily distinguished by a much weaker bitter, and by the fineness of its epidermis; it is often found with the *Huanuco*.

IV. *Cascarilla pagiza.*

This is the bark of the *C. ovata*, Flor. Per.* Not being received in commerce, they mingle it with the *Huanuco* and other barks; but it is chiefly employed in forming the extract which is sent from Peru. When used alone in the extract of Panao, it yields a stronger bitter than that of the *C. magnifolia*, but not so transparent.

M. Zea thinks that the yellow Quinquina or *C. cordifolia* is the same species; but M. Ruiz, though of the same opinion, is yet disposed to believe that the specimens and barks of the *cordifolia*, upon which he has founded his opinion, having suffered a little in the carriage still leaves some doubts as to this identity.†

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* *Foliis ovatis subtus tomentosis, paniculâ brachiatâ, floribus sub-corymbosis, corollis purpureis: limbo hirsuto.* It grows in the woods of Puzuzu and Panao, flowers from June to October, attains the height of ten yards, and is remarkable for the size of its leaves after the *magnifolia*.

† The difference of the specific names given on the spot by the authors of the *Flora Peruviana* and by Mutis, seems to confirm the doubt of M. Ruiz.

The surface smooth; the epidermis fine, whitish, on account of the lichens which cover it; the other parts of the bark of a dark red, and deeper than that of the Cinnamon of Manilla; about a line in thickness; the size from a goose-quill to an inch in circumference or rather more. This bark is well rolled, spongy, easy to break, and presents long fibres on the two separated edges; its bitterness is slight but agreeable; it is also sufficiently styptic; it exhales an odour on decoction.

V. *Cascarilla bobo de Hojas Moradas* (Mulberry-leaved). (*C. purpurea*, Flor. Per.)*

This species grows in the mountains of the Panatahuas and of Huanuco: its bark is not received singly in commerce. It has been found mingled with those of the three species denominated *nitida*, *hirsuta*, and *lanceolata*, frequently also with the Huanuco of commerce. Some practitioners place it among the most efficacious barks; but M. Ruiz considers this decision too hasty, and not yet confirmed by experience. The following are its distinguishing characters:

Surface smooth, in some cases rather rough, covered with little lichens; the uncovered parts of a tawny colour more or less clear; the internal surface yellow inclining more or less to red; rarely a line in thickness, and commonly less than an inch in circumference; easily broken, but not very spongy; fracture rather clean, only a few small fibres in its internal part; commonly well rolled, considerably bitter, aromatic, and strongly styptic; it exhales a strong odour on mastication and in decoction.

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* *Foliis oblongo-ovalibus ovatisque purpurascentibus, paniculâ brachiatâ magnâ, floribus sub-corymbosis, corollis albo-purpureis: limbo hirsuto.* Its bark is much sought in commerce, and is in considerable repute among practitioners.

VI. *Cascarilla leonado obscura* (dark tawny).

A bark of an unknown species very commonly met with in the Huanuco. It has obtained the name of *leonado obscura* from its greyish-brown colour both on the epidermis and the internal parts; the colour is darker within; it approaches in some characters to the Pagiza; but it has a strong disagreeable taste, which with the colour is sufficient to distinguish it from the Pagiza. It grows on the mountains of the Huamalies and of the Panatahuas; is regarded as a Quinquina of middling quality, and is not described by M. Ruiz.

VII. *Cascarilla melada* (honey-coloured).

A species also unknown, and not described by M. Ruiz. Its bark is pretty thick, and well rolled; its external surface rough, of a reddish grey, cut in transversal and very deep slips, and clothed with an epidermis of half a line or nearly in thickness, which separates easily; its internal surface is rough, of a yellow red and unequal tint; it is strongly bitter, styptic, and very disagreeable when masticated.

VIII. *Cascarilla fulva.*

It is said that this species was discovered by M. Tafalla, but the specimens and description have not yet arrived. Its bark is one of those which occur most commonly in the Huanuco.

Barks well rolled, and bearing much resemblance to those of the Cascarilla amarilla of Loxa in colour and thickness; but they are easily distinguished and recognised, as being very conisderably styptic, and as having a very faint bitterness and smell: there is nothing disagreeable in their taste. M. Ruiz places this species among the middling Quinquinas.

OTHER SPECIES,

MORE OR LESS KNOWN IN SPAIN.

Cascarilla naranjada de Santa Fe. Cinchona lancifolia of Mutis, *C. tunita* of Lopez,* *angustifolia* of Ruiz and Pavon.†

The specimens brought by M. Lopez from America on his second voyage to Spain, under the name of *C. tunita*, belong undoubtedly to the same species which Mutis has designated under that of *lancifolia*; for M. Zea, who has so often seen the latter on the spot, could scarcely remark any difference in the size of the leaves.

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* M. Lopez says that the discovery of the tree to which this bark belongs was made by him in 1776 at Santa Fe. Messrs. Ruiz and Pavon have given a botanical description of it according to the specimens of M. Lopez.

† *Foliis lanceolatis angustis, marginibus retroflexis, pedunculis axillaribus trifidis, laciniis tri-septemfloris. Habitat in Sanctæ Fidentis regni sylvis, civitati confinibus, unde D. D. Sebastianus Lopez in Hispaniam exemplaria sicca asportavit.* Ruiz *Suppl. Quinologia.*

Great discussions have taken place on the qualities of this Quinquina, its discovery, the time when it came into use, &c. between M. Ruiz and his pupil, and the pupils of M. Mutis, among whom we remark M. Zea. The latter regards this Quinquina as the most ancient and the most rare; yet M. Mutis, in speaking of the first Quinquina that was used, says nothing of its species. Early authors only say that the bark had a red colour similar to that of Cinnamon, which may equally apply to some species of Loxa, and to the orange-coloured Quinquina of Mutis. As to its febrifuge and balsamic qualities, experience alone can pronounce upon them. We shall refer, by the way, to what Don Gregorio Banares, a Spanish chemist, and a stranger to the discussion which has arisen between Zea and Ruiz, says of the fine Quinquinas of Santa Fe: "The effects of these Quinquinas have not answered the wishes and exaggeration of the author; and their principles, except the red Quinquina, are not the same with those of Loxa and the Calisaya; the orange Quinquina does not affect animal jelly; the yellow does not decompose the jelly, but, as well as the white, often turns the solution of sulphate of iron green." We intend to repeat these analyses, together with those of the other Quinquinas.

Surface rough, split transversely, and covered with mucors of a clear tawny colour with some blackish spots; internal surface more or less orange-coloured, pretty well rolled, from half a line to a line in thickness, and from half an inch to an inch in circumference; fracture fibrous, the two fragments being crowned with little longitudinal fibres; it is with some difficulty frangible, though the circumference is spongy; its smell is faint, and very perceptible on pulverization or decoction; the bitterness sufficiently manifest and not agreeable; not styptic.

Considerable resemblance exists between this bark and that of the species discovered by Tafalla at Chicoplaya, of which we have previously spoken. The only difference is, that the barks of the latter are cloven both transversely and longitudinally, presenting more inequality in size and thickness, and more irregularity in the colour of their internal surface; in other respects they are the same.

Quina blanca de Santa Fe. *C. ovalifolia* Mutis.

M. Vahl has published the white Quinquina of Santa Fe under the specific name of *macrocarpa*,* according to the specimens of it which he received from Professor Ortega of Madrid. The barks of the *macrocarpa* have a greyish epidermis, very fine and soft to the touch; the internal surface yellowish, smooth, shining, and furrowed; the interior of the bark of a greyish yellow; thickness from a quarter of a line to a line; they are rather spongy internally and in flat pieces; they crack easily between the teeth, and readily dissolve in the mouth, which, perhaps, causes them to be regarded as very *saponaceous*, slightly styptic, and of a very perceptible though not agreeable bitterness. M. Pavon believes that the *macrocarpa* does not belong to the genus Cinchona. This Quinquina is little valued in Spain, and is not current in commerce.

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* *C. macrocarpa, foliis oblongis, subtus pubescentibus costatis.* Vahl.

Asmonich.

This is the name given by the natives of Puzuzu and Muna to the *C. fusca* of M. Ruiz, which is, according to M. Zea, the *C. rosea* of the *Flor. Per.*[*]

Surface smooth; epidermis a clear grey, with spots more or less dark; the interior of this bark is of the colour of chocolate, very little or not at all rolled in consequence of its extreme aridity; in thickness half a line; breadth an inch or nearly; very light, fragile as glass, without leaving any fibrous trace; a faint odour of Quinquina, very little bitterness, but a very strong and peculiar stypticity.

Cascarilla baya (bay Cascarilla).

M. Ruiz has made known to us this bark, which comes from Santa Fe, and which must not be confounded with the *cordifolia* of Mutis, though it has a little affinity with it in colour. It has a fine epidermis, sometimes tawny, sometimes grey, and at other times a greenish grey; its colour is of a yellowish tawny; it is well rolled, has a clean fracture with some little fibres in the internal part only; its bitterness is slight, but rather agreeable, as well as its smell.

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[*] *Foliis oblongis obtusè acuminatis, paniculâ brachiatâ, floribus corymbosis, corollis roseis: limbo margine tomentoso.* It is one of the rarest species; we have not been able to procure its bark. It is described by M. Ruiz in his *Quinologia.* The Indians use its flowers to adorn their pagodas.

In 1805 and 1806 there were considerable quantities in the commerce from America; connoisseurs regard it as one of the best yellow Quinquinas.

Cascarilla amarilla de Juta.

This yellow Quinquina is frequently received without admixture; it much resembles the *pagiza*.

Its epidermis is very fine and of a reddish grey; external surface smooth; internal surface rough and of the colour of ochre: difficult to break; fràcture clear; slightly bitter without being disagreeable, very little aromatic, in considerable repute.

QUINQUINAS

RECENTLY DISCOVERED BY TAFALLA.

I. *Cascarilla de hoja aguda.* *C. angustifolia,* Flor. Per.[*]

Its bark is designated by the following characters: Surface rough with transversal fissures more or less deep; epidermis fine, very adhesive, of an ashy tawny, with whitish and blackish spots,[†] internally of rather a darker red than that of Manilla Cinnamon; of the middle size. The thickest barks are nearly an inch in circumference, and the smallest are of the size of a goose-quill; thickness a line or less; fracture easy with some fibrous filaments; taste bitter, styptic, and nauseous; smell faint and disagreeable. This bark is not much rolled, and is in little repute; it is found mixed in considerable quantities in the chests of common Quinquina brought from America, or compounded by the Europeans after their manner.

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[*] *Foliis ovatis acutis, paniculis terminalibus brachiatis, corollis candidis glabris.* It grows in the lower woods of the Andes of Peru near the River Taso; flowers in the months of April, May, and June.

[†] This character readily distinguishes when it is mingled with barks of red Quinquinas; and its nauseous taste decidedly separates it from the Quinquinas of Loxa, with which its fineness and even its internal colour might cause it to be confounded.

II. *Cascarilla negrilla* (blackish).

This is the *C. glandulifera,* Fl. Per.*

Surface rough with some slight transversal fissures; epidermis greyish with some tawny and blackish spots; the parts destitute of epidermis of the colour of rust; internal surface of a pale yellow and rather smooth; size small, less than that of a goose-quill; thickness below half a line; fracture easy, and crowned with small parallel fibres; bitterness sufficiently perceptible, slightly aromatic and extremely styptic, but not disagreeable; odour faint and agreeable as in the good Quinquinas. It frequently appears among the Quinquinas of Loxa; and is easily known by its spotted surface. M. Tafalla having sent specimens and samples of these two barks, they have been well described by the authors of the *Flora Peruviana.*

III. *Cascarilla aharquillado.* Dichotomous.†

In 1797 M. Tafalla sent from America the specimens of this new species, but he forgot the barks. This Quinquina is much esteemed at Chicoplaya, and is classed among the fine species.

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* *Foliis ovato-lanceolatis supernè glandulosis, paniculis sub-corymbosis, corollis albo-roseis e limbo intus lanuginoso.* It grows in the Andes of Peru, in the woods of Chicoplaya and Monzon; attains the height of three yards only; flowers in February and March. Its bark is ranked among those of middling quality, according to M. Ruiz.

† *C. dichotoma, foliis oblongo-lanceolatis, pedunculis terminalibus dichotomis paucifloris, capsulis angustis linearibus longis,* Flor. Peruv. Five yards in height; is found in the woods of the Peruvian Andes; flowers from January until April. Its bark is in little esteem; M. Tafalla gave it the specific name of *pauciflora.*

IV. *Fine Cascarilla of Chicoplaya, de Flor pequena* (with small flowers).*

The specimens arrived with those of the former species, but without the bark. This new species is much esteemed where it grows.

The bark of the *C. Caribæa* of Jacquin is not used in Spain. It is thought that this might form a new genus between *Cinchona* and *Portlandia.*

Lastly, we shall just observe that the botanists of Peru think that the *C. corymbifera* of Forster should be a little better examined on account of its axillary corymbi, a character peculiar to *Portlandia.*

It remains for us to annex a Table of the species lately discovered by Tafalla, and known here by the drawings which he has caused to be carefully executed on the spot, and which he has addressed to the authors of the *Flor. Per.* These botanists have published nothing on the new discoveries, because they are waiting for the specimens and barks which have been sent from America, and which are probably at Cadiz. Being unable to copy the plates, we have noted the most distinctive characters which each drawing has presented to us, in order to give an idea of the new species.

These notes have been made under the inspection of M. Pavon.

* *C. micrantha, foliis ovalibus obtusis, paniculá maximá, floribus numerosis parvis, corollis albis: limbo lanato,* Flor. Peruv. It attains the height of twenty-five yards, and grows in the Andes of Peru, on the side of Chicoplaya.

N.B. In the *Flora Peruviana* is found another species of Quinquina, under the name of *grandiflora, foliis ovalibus obovatisque subaveniis coriaceis subtus albidis, corymbis terminalibus, corollis magnis;* but it appears that it is reserved to form a new genus with one of the species recently discovered by Tafalla.

Specific Names.	Names current in the Province of Quito, and Botanic Characters.
C. MICROPHYLLA.	*Cascarillas con hojas de roble* (oak-leaved).—Fol. ovatis rugosis minoribus.
	C. pata de galinazo.—Fol. lanceolatis glandulosis, petiolo nervoque centrali sanguineis.
	Id. id. Second species.—Fol. ovatis acuminatis, capsulis sanguineis.
	C. parecida a la buena.—It is not known whether this be a species or a variety.
	C. chahuargaz (Indian name).—Fol. glandulosis lanceolatis subrepandis, capsulis ovalibus.
	C. con hojas de Palton (Pyri indicæ genus).—Fol. lanceolatis glandulosis subtus luteo virescentibus, capsulis ferrugineis.
	C. crespilla mala (curled leaved).—Fol. ovato-lanceolatis obscurè virescentibus, capsulis ferrugineis.
	C. con hojas de Lucuma.—Fol. Lucumæ, capsulis ovatis.
	Id. id. Second species.—Fol. subpanduriformibus, capsulis subglobosis.
C. VAINILLODORA.	*C. de flores grandes y blancas qui huilen la vainilla.*—Fol. lanceolatis obtusis nervosis, floribus albicantibus magnis, capsulis clavatis.
C. ANGUSTIFOLIA.	*C. de hojas angustas.*—Fol. lanceolatis angustis nervosis glandulosis.
	C. palo blanco (white wood).—Fol. lanceolatis undulatis venosis: marginibus reflexis.

Specific Names.	Names current in the Province of Quito, and Botanic Characters.
C. ANGUSTIFOLIA.	*C. con hojas rugosas.*—Fol. ovatis integerrimis rugosis.
	C. colorada.—Fol. inequaliter ovatis acuminatis nervosis glandulosis, floribus internè bicoloribus, capsulis virescentibus.
	C. crespilla ahumada.—Fol. obovatis nervosis rugosis.
	C. amarilla. — Fol. obovatis acuminatis, floribus internè incarnatis.
	C. crespilla.—Fol. subrotundo-ovatis: marginibus convexis, floribus into dilutè-rubris.
	C. con hojas poco velludas (villose-leaved). —Fol. subvillosis glandulosis, floribus internè violaceis.
	C. negra.—Fol. floralibus ovatis, floribus internè purpureis.
	Id. Second species.—Fol. floralibus subcordatis glandulosis, floribus purpureis.
C. RUBICUNDA. ..	*C. rubicunda.*—Fol. ovatis, floribus internè rubescentibus.
	C. serrana (growing in the mountains).—Fol. obscurè viridibus, floribus obscurè rubicundis.
C. MACROCARPA ..	*C. canelas.*—Fol. cordatis rotundatis maximis, floribus albicantibus maximis, fructu maximo.
	Cuñas de gato.—Stipulis revolutis, floribus capitatis conglomeratis.

DESCRIPTION OF THE TREE
KNOWN IN THE KINGDOM OF PERU UNDER THE NAME OF
QUINQUINO,
AND OF ITS BARK, CALLED QUINQUINA,
WHICH IS DISTINCT FROM THE QUINA OR CASCARILLA.

BY DON HIPPOLITO RUIZ.

THE Quinquino* is a branching and elegant tree, which grows to the height of thirty varas and upwards. The trunk is thick, straight, smooth, covered like the branches with a grey, coarse, compact, heavy bark, granulated, and of a pale straw colour in the interior; filled with resin, which, according as it abounds more or less, changes the colour to citron, yellow, red, or dark chesnut; the smell and taste are grateful, balsamic, and aromatic, resembling those of the Red Peruvian Balsam sold in the druggists' shops under the name of White Balsam. The branches extend almost horizontally. The leaves are alternate, and composed of two, three, four, and sometimes five pair of leaflets, nearly opposite, and ovato-lanceolate acute, but with the apex somewhat obtuse and emarginate, smooth, shining, entire, marked with transparent spots, hairy on the under surface, and with a short footstalk; many leaves terminate unequally, and in this case consist of five, six, or nine leaflets. The common petioles are thickish and hairy. The flowers spring from the scars of the young branches, and from the axillæ of the leaves, in single racemes larger than the leaves; florets sparsed, pedicelled, erect, supported by a small ovate concave flexible bractea. The calyx is dark green, campanulate, divided into five small and nearly equal teeth, but one of them so far separated from the rest as to be found placed under the germen, and they all fall off when the flower withers.

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* *Myroxylon peruiferum. Flor. Per. Mss. cum Icone. Myroxylon peruiferum Linn. Supp. pl.* 34 *and* 233. *Hoitziloxitt. Hernandez Hist. Mex. p.* 51. *Edit. Matr. tom.* 1. *p.* 373.

The description and plate of the *Myrospermum* of Jacq. Amer. 120. tab. 174. fig. 34. compared with mine and with the description of the younger Linnæus, indicate clearly that the *Myroxylon* and *Myrospermum* are species of the same genus. Also the generic notes with which Linnæus forms his incomplete generic character of *Toluifera*, agree with those of *Myroxylon* and *Myrospermum*. My observations lead me to think that those three genera ought to be placed under one only, that of *Myroxylon*, on account of its being the most known and best described.†

† See my remarks on these Genera in Brande's Journal, No. 19, p. 28.—A. B. L.

The corolla is composed of five white petals, four of these narrow, equal, lanceolate, and larger than the calyx; the fifth reflexed, broad, and twice the size of the others. The stamina consist of ten filaments inserted into the calyx and inclining to one side; the antheræ elongated, sharp-pointed, and sulcated. The pistil consists of an oblong germen, supported on a curved pedicle, inclining with the stamina to the same side; the style short, subulate, and crooked, and the stigma simple.

The pericarp pendulous, straw-coloured, nearly two inches in length, club-shaped, somewhat curved, globular near the top, and terminated by the curved style; contracted towards the base, and compressed into the form of a rough tube, wrinkled, ductile, thick, furnished with two ribs or edges; the globular part is composed of a single cell, which contains one seed, which is crescent-shaped, projecting from the cell, and between this and the lining of the pericarp is filled with a yellow liquid balsam, which in time dries and becomes as hard as resin.

The Quinquino grows in the mountains of Panatahuas, in the forests of Puzuzu, Muña, Cuchero, Paxaten, Pampahermosa, and in many other countries near the river Maranon, in low, warm, and sunny situations; it blossoms in August, September, and October. The natives of the country call the tree by the name of Quinquino, and its bark and fruit by that of Quinquina, a plant very different from our Quina or Cascarilla: others call the tree also Quinquina, but it is more commonly known under that of Quinquino.

The Indians of Puzuzu and the abovementioned countries do not collect the balsam of this tree: whether it is that they are ignorant of the method of obtaining it and of its value, or because few trees are found in the neighbourhood of their towns, the only parts which they collect are the barks most filled with resin, condensed into drops and lumps, and the fruits, in order to sell them in the neighbouring provinces, both of which are used for the purpose of perfuming cloth and apartments. It is called Perfume of Quinquina, to distinguish it from the true perfume, which is a composition of Benzoin, Storax, and Ambergris, these substances being formed into a paste from which they make pastils.

The fruit as well as the bark being reduced to a coarse powder, they mix with it oil of Maria, Carana, Jacamaca, Lera, or Sebo, and make with it little plasters, which they apply upon the temples and behind the ears to mitigate the pains of the head ache and the tooth-ache, particularly the hemicrania or Jacqueia. It closes recent wounds, strengthens the brain, mitigates the pains proceeding from agues, and dissipates the shiverings produced by fevers.

The other uses and virtues of the fruit, bark, and balsam may be read in the works of Dr. Hernandez.

The balsam of Quinquino is procured by incision at the beginning of spring, when the showers are gentle, frequent, and short; it is collected in bottles, where it keeps liquid for some years, in which state it is called White Liquid Balsam. But when the Indians deposit this liquid in mats or calibashes, which is commonly done in Carthagena, and in the mountains of Tolu, after some time it condenses and hardens into resin, and is then denominated Dry White Balsam, or Balsam of Tolu, by which name it is known in the druggists' shops.

It is generally believed, and M. Valmont de Bomare says in his Dictionary of Natural History, that if an extract be made from the bark by boiling it in water, it remains liquid and of a blackish colour, known under the name of Black Peruvian Balsam. There is no difference in these three balsams, excepting in the name, colour, and consistence.

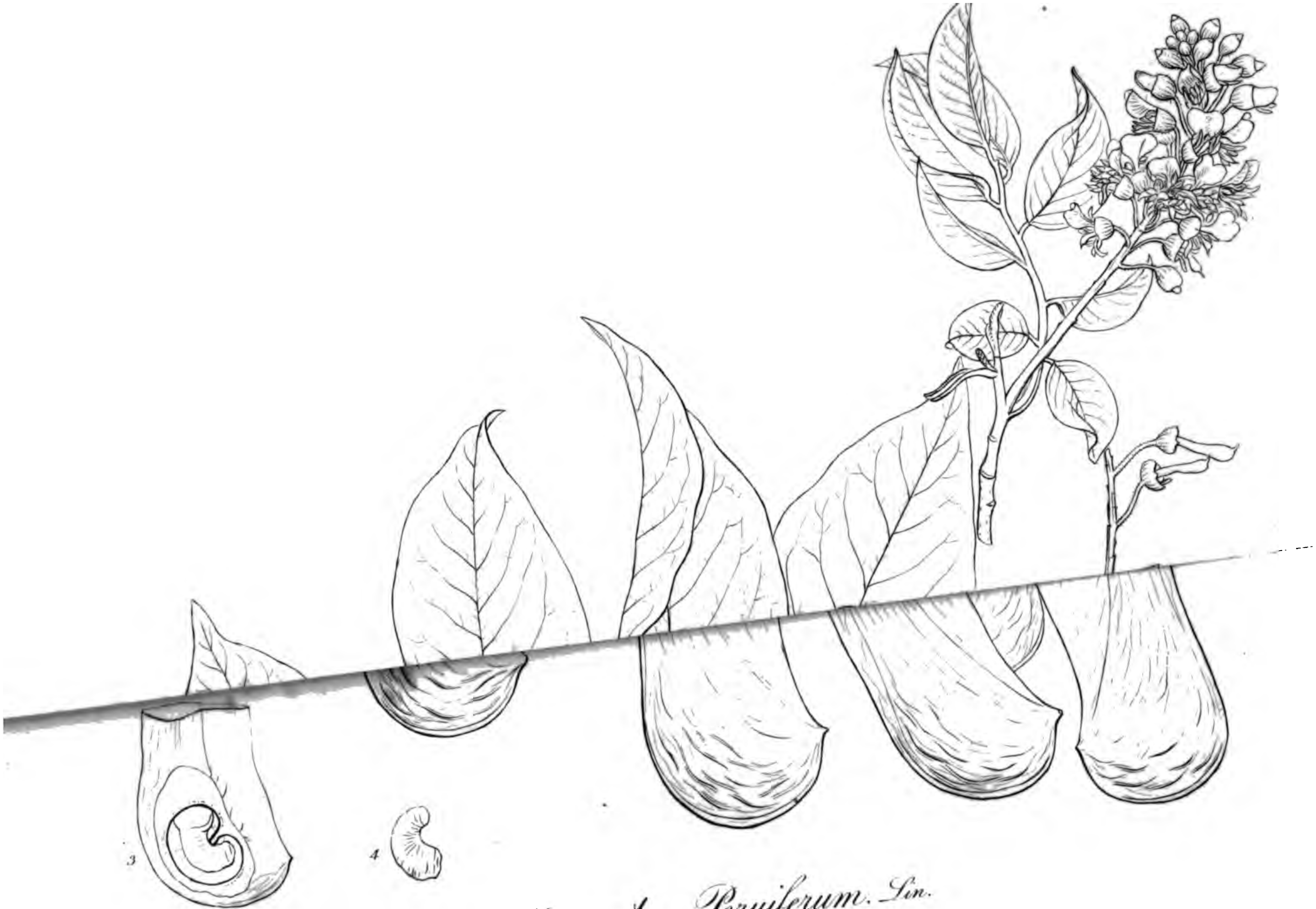
The wood of the Quinquino is extremely compact, heavy, and durable, but on account of its uneven grain is difficult to fashion into any shape; it lasts for many years without being injured, and is never exposed to the attack of worms; it even remains sound for a long time when placed in wet situations, nor does it crack when exposed to the sun; wherefore the Indians make use of the trunks for beams and stanchions.

A species of sparrow called Poccochycnys, Kenychis, and Hedrondes, make their nests at the extremity of the branches of the Quinquinos, selecting for that purpose the most solitary and slender, without doubt to prevent monkeys, and other climbing animals which mount those trees, from plundering their eggs and preying upon their young. The texture of these nests is worthy of admiration; for, besides the singularity of their resembling the pericarp or fruit of this tree, they form them with such art and neatness, with straw, bark, and other flexible materials, interwoven in such manner that they resemble purses of trellis work, a vara and a half in size, more or less; and lining them at the bottom with ceibo and other soft cottony substances, they leave them hanging from a branch, a support to all appearance incapable of sustaining such a weight, and resisting the oscillations and movements with which they are continually agitated by the wind. They suffer no other birds, that are not of their own species, to rest on the trees where their nests hang, and they particularly dislodge from them the larger birds and the birds of prey by attacking them.

These birds are called Hedrondes, from the smell which exhales from them, and which they leave in their nests. They are called Kenychis, which signifies "adorned," on account of the various colours of their feathers, and Poccochycnys, which signifies "become ripe," on account of that being a word frequently heard in their scream or song, which word has some analogy to their nature; for they always place themselves near fruit on the point of becoming ripe, in such a manner that they seem to watch and guard them until they ripen, and then they pluck them and fly off with them to their young. The Indians, who are not ignorant of this fact, avail themselves of it to mark those places where they come with the fruits, which are commonly plantains, annonas, chyrimoyas, papayas, pine-apples, or ananas.

If the Pocoochycnys perceive any one picking the fruit, or even coming near them, they give evident signs of their displeasure, flying from side to side, and repeating without ceasing the cry or word Poccochycny, with other unintelligible screams, first in a shrill and quick tone, and afterwards soft, slow, and mournful.

The Poccochycny is a bird of the size of a Polla Galina, with the beak an inch and a half in length, conical, convex, and



Myroxylon Peruiferum. Lin.

straight, very sharp, and inclining to a white colour, with two yellow spots in the front of the head. The claws black, with four toes, and the nails crooked; the lower part of the neck is as yellow as the yolk of an egg, the upper part and the wings black, with eyes between chesnut colour and yellow; the rest of the body of a dark chesnut, with the tips of the feathers white. They take short flights; for when they fly highest they do not ascend above 300 toises, forming a curve from the place whence they ascend to the point where they rest; and though their wings are continually in motion, their velocity is not great. Those birds having perched themselves, begin to make the low sound Poccochycny; they lower their heads, and half-extending their wings, they grasp the branch with their claws, and suspend themselves from it, which movement they make every time they utter the cry: they feed on pulpy fruits. They are found on the mountains of the Andes, in low and warm places near towns and villages. This species belongs to the genus *Oriolus* of Linnæus.

EXPLANATION OF THE PLATE.

1. A flower magnified.
2. The curved germen surrounded at the base by the campanulate calyx.
3. Part of the one-celled pericarpium, shewing the projecting seed.
4. The crescent-shaped seed.

MEMOIR

ON THE

GENUINE CALAGUALA,

AND TWO OTHER ROOTS,

WHICH ARE SENT UNDER THE SAME NAME FROM SOUTH AMERICA.

BY DON HIPPOLITO RUIZ,

FIRST BOTANIST TO HIS MAJESTY IN THE EXPEDITION TO PERU,

&c. &c. &c.

PRELIMINARY NOTICE.

AT the repeated request of several professors of the three branches of medicine, both in Spain and in foreign states, for copies of the Memoir on the Genuine Calaguala which I inserted in the first volume of the Transactions of the Royal Medical Academy of Madrid, together with that on the *Ratanhia*, *Canchalagua*, and *China Peruviana*, I have been encouraged to reprint it in a separate form. I have added some illustrations, and an accurate engraving from the original drawing, for the more complete description of a vegetable hitherto not sufficiently known to naturalists, and for which reason there have been and are current in commerce many roots of different *cryptogamous* plants of little or no virtue, to the disparagement of the efficacious and genuine Calaguala, which casually though rarely reaches Spain; and if it comes to the hands of druggists and dealers, they unjustly decry it, preferring the roots of a plant of a distinct genus, and of no virtue, as equivalent to the Calaguala; of which proof will be adduced in the proper place.

ARTICLE I.

Of the Calagualas commonly brought to Europe from South America, the origin of their use, and the etymology of their names.

Little advantage can be derived from the knowledge and distinction of plants, or of any other natural productions, if we neglect the study of their uses and virtues. Nor can any great benefits arise from the knowledge of the uses and virtues of plants and other productions, without previously obtaining a clear and distinct idea of the plants themselves: hence, the observer who would acquire results adequate to his labours and researches, must indispensably unite to the knowledge and discrimination of natural substances, the investigation of their uses, virtues, and properties.

The ancients discovered and were aware of the virtues, uses, and properties of many vegetables and other natural productions, as appears from their writings; but the little care they took in transmitting to posterity a clear and distinct knowledge of the various species, has occasioned the confusion, obscurity, and doubts, which beset us respecting the objects on which they treated.

The Calaguala, which is one of the simples used for many years past in medicine, is also one of those vegetables which have not been sufficiently distinguished by the Faculty, or even by botanists themselves, much less by dealers and druggists. It is owing to this want of distinction that use is made in medicine, not of the genuine Calaguala, but of the roots of other plants of the same genus, or of others in affinity with it, which never can produce exactly the same effects which are experienced by the Indians and natives of Peru from using the root of the real Calaguala; and hence too proceed the total neglect and discredit into which the Calaguala has fallen among the profession in Spain.

The cupidity of dealers in drugs has probably introduced into medical use the different species of Calaguala, now consumed without any particular use or advantage, to remedy in some degree the injury likely to result to the public from the use of the supposed Calaguālas sold by the druggists. I have undertaken in this Memoir to define exactly the three species of roots of the Calaguala, which we receive most frequently and in the largest proportion from the kingdom of Peru.

Though it is very difficult to ascertain precisely the origin and use of the genuine Calaguala,[*] exclusive of that which the Indians least civilized and most remote from the track of Europeans make of this root, it may justly be inferred, that the natives already used the Calaguala before the Spaniards entered those countries, as a sudorific, solvent, deobstruent, and anti-rheumatic remedy. At the present day, not only those Indians who have very little communication and dealing with the Spaniards, but also the Spaniards themselves, and most of the Indians of Peru and people of other castes, make frequent use of the Calaguala for the same purposes.

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[*] Don Diego Perez Bravo, Member of the Royal Medical College of Seville, in a *Botanico-pharmaceutical dissertation* on the *Calaguala*, which he read in the year 1754 before the Royal Society of that city, and which merited the greatest applause, and was printed in the following year, says, that according to the testimony of the most respectable naturalists of Peru, the first discovery of the Calaguala, and of its medicinal use, was made in the province of Caxamalca, (now called Cacamarca,) and that afterwards its use was discovered and diffused through Cuzco, Huamanga, and other districts.

The dealers, druggists, and professors of medicine include, under the name of *Calaguala*, three species of roots brought from Peru; but the Indians and natives of that kingdom distinguish these three species by very different names, derived, with sufficient propriety, from their respective plants. They call the first and genuine Calaguala, *Ccallahuala*; the second, *Puntu-puntu*; and the third species *Huacsaro*.

The word *Calaguala*, or rather *Ccallahuala*, as it is written and pronounced in the Quichoa or general language of Peru, is derived from the Indian noun *ccallua*, answering in Spanish to a trowel or batten, an iron instrument shaped like the head of a lance, with which the Indian female weavers press the threads of their webs; and from the noun ***huahua*** in the general language, or ***hualas*** in that of Chinchaysayo, which in both signifies ***boy***; and the words united into *Ccallahuala* signify a ***boy's batten***, because children use the leaves of the Calaguala in their sports as battens, from their similarity in shape, and with them imitate the labour which they often see their mothers perform.

The name of ***Puntu-puntu***, given to the second species of Calaguala, signifies a thing of many points, because the lower side of the leaves of this species of ***Polypodium*** is found full of fructifications or orbicular points. Some natives of Peru are also accustomed to call it Lengua de Ciervo, (***Deer's tongue***,) a name doubtless given to it by the Spaniards.

The third species of Calaguala is called ***Huacsaro***; that is, a back covered or masked; because the fructifications entirely cover the lower side or back of the leaves of the plant.

The dealers and traders distinguish them by the names of slender Calaguala, thick Calaguala, and middling Calaguala or *little cord* from its figure. The term Calaguala is likewise extended to all roots collected from different genera and species of the family of the *Filices* or Ferns, and they pass in commerce as genuine species of the Calaguala.

In the provinces which I have traversed in Peru, I have not seen or ascertained that any use has been made of the third species of Calaguala, called Huacsaro, though it occurs in greater frequency and abundance than the other two; but considerable portions of it are brought from Payta and Huayaquil to Lima, destined for Cadiz, whence it is distributed through all the provinces of Spain, and to foreign states.

The infusion or decoction of the *Puntu-puntu* is used as an anti-pleuritic remedy, and it is only in pains of the side that this species is employed. Of the first or genuine Calaguala frequent use is made in Peru as a solvent, deobstruent, sudorific, and anti-rheumatic remedy; and as such the Indians of the provinces of Canta and Huarocheri bring this species for use from Sierra to Lima, together with various other medicinal plants; and they never return to their homes without having in the course of one or two days disposed of the whole in the neighbourhood; which proves the great use made of its roots, and consequently the effects which they produce, though their virtue is reputed by some persons in Spain and in other parts of Europe to be merely imaginary.

In addition to the three species of Calaguala of which I treat in this Memoir, collectors are accustomed to procure and mix up with the roots of the first those of other species of *Poly-*

podium, so similar at first sight, that the sole difference seems to consist in their *habitats*, and in the different colour and size which appear among them. Yet after repeated examinations and detailed comparisons which I made of all three, notwithstanding the distances at which each of them grows, I resolved to establish them as distinct species, and not as varieties, as I had at first supposed, being misled by the disposition of the leaves. In this respect I relied on the following difference:

The genuine Calaguala, whose fructifications are disposed in two longitudinal lines, placed in quincunx order, as are also the points of the fructifications of these two other species of the *Polypodium*, differs from them both not only in the magnitude and colour of the leaves and roots, and its growing on hills and rocks, in dry chalky soil or in caves, but also in having crooked roots much more fibrous and scaly, ash-coloured, and of easy mastication when dry; they are of a more intense bitter; the figure of the leaves is more lanceolate than that of the other two; the leaves are also different in thickness and consistency, the margins revolute, and the points or fructifications are more rectilinear, without deviating so much from the nerve of the leaf as those of the other two species, which, moreover, grow in warm places, some leagues distant from the hills and wilds, and delight in rich soils or trunks of trees; they have much longer leaves, rather linear than lanceolate, of softer consistency, less thick, and with entirely flat margins; the points of fructification, which abound more in these than in the genuine, have not the same regularity in their disposition, some of them deviating from the nerve of the leaf towards the edges, forming occasionally three or four confused lines, and the exterior ones almost always irregular. Though they are distinct species from the genuine, which is daily used in Peru, they might both, in case of necessity, be substituted for it, in preference to all the other kinds current in commerce, because their roots are scarcely distinguishable from it, in consistency, colour, smell, or taste, though in a less active degree.

Among the multitude of cryptogamous plants which grow in the mountains of the Andes, are found many species of the genus *Polypodium*, which from their single and very entire leaves, more or less lanceolate, are with difficulty distinguishable from each other without minute examination and comparison. In this and in similar cases, it is indispensable that the observer, in order to define well the differences of the species of a genus bearing great resemblance to each other, should avail himself of such comparison, since by defining them separately at different times and places, he is liable to produce almost uniform definitions; and consequently the readers, not finding sufficient marks of distinction, take them for mere varieties of the same species. This may be presumed to have been the case with collectors of the different species of the Calaguala, whose roots are now sold and used indiscriminately in medicine as roots of the genuine Calaguala, of which I have here given a description, explaining the specific difference. I am under the necessity of extending it, by availing myself of the examination and comparison of the *Polypodium Calaguala,* with the other two species nearest allied to it, which during my travels in South America I have observed to be mixed and sold as one species by traders and dealers.

ARTICLE II.

Of the Habitats of the three Species of Calaguala, their Collection, and Exportation.

The situations most favourable to the vegetation of the first or genuine species of Calaguala, are the hills, *punas*, or wilds, and places of cold temperature adjacent to the Cordilleras of the Andes, or, as we may call them, the Alps of Peru, where the cold prevails throughout the year, especially by night, though the snow never settles or congeals on them. This species generally grows in the clefts and sides of the rocks, or upon them if they are covered with a thin stratum of earth, in quarries, and gravelly, sandy, or clayey places, in which occur a very few diminutive plants of other genera, and where the showers, though generally frequent, do not collect, on account of the declivity and the rocky nature of the ground. It grows spontaneously and very abundantly in many parts of the provinces of Huarocheri, Caxatambo, Tarma, Canta, Xauxa, Huancavelica, Huamanga, Cuzco, Huanuco, Huamalies, Huaylas, Caxamarca, Caxamarquilla, and many others situated among the Cordilleras and mountains of the Andes, belonging to the kingdom of Peru, as well as those of Buenos Ayres and Santa Fe. The root of this Calaguala is gathered, though in very small quantities, in several of these provinces, from whence it is taken down to the ports of Huayaquil, Payta, and Callao, and thence exported to Cadiz.

The second species of Calaguala, known in Peru, as we have already observed, by the name of ***Puntu-puntu***, and in some provinces by that of Lengua de Ciervo (***Deer's tongue***), grows near the base of the Andes in sheltered situations, and in stony and rocky grounds generally covered with rich soil produced from the decomposition of the leaves and other remains of larger or smaller plants, and especially of mosses, the family of which is abundant in those situations. They delight in airy and sunny places; indeed the Puntu-puntu is generally found in grounds that have been cleared of trees, where the sun shines freely during most of the day, and where the cold is scarcely felt, except at night. This species abounds in the provinces of Xauxa, Tarma, Huanuco, Panatahuas, Huamalies, Huaylas, Caxamarquilla, Caxamarca, and other provinces contiguous to the frontiers of the Andes, in many of which, quantities are gathered in full growth, and sent for sale to the traders at the sea-ports, who export them to Spain by way of Cadiz.

The third species of Calaguala, denominated *Huacsaro* by the Panatahuas Indians, is found in greater abundance than the two former, on extensive tracts, and on peaks less elevated than those where the first is found, though cold at night, and covered with pasturage and plants, such as the *Ichus*, a species of Jarava, and other grasses, on which the Vicuñas, Huanâcos, and Llamas graze; *Siracas*, a species of Rubus; *Chinchanchos*, a species of Hypericum; *Ocssa Purga*, a species of Sisyrynchium; *Milucassa*, a species of Mespilus; *Pucssato* and *Sumacmisqui*, a species of Thibaudia, a new genus of the Ericeæ; *Sogonches*, species of Gardoquia, &c. The ground is generally stony, covered with a stratum of earth more or less thick. The Huacsaro likes the air and sun; and wherever it grows, the spot is uniformly exposed to the morning and evening sun, or during the day when the weather is unclouded.

There are such tracts of the Huacsaro, that from one of them may be gathered from 75 to 150 pounds of roots. Though it is very abundant, and grows spontaneously in the provinces of Tarma, Xauxa, Huánuco, Huamalies, and in that of the Panatahuas, I have never heard that the natives collect its roots for trade or other purposes, nor indeed those of another species of the same genus, which grows abundantly among the Huacsaro; and collected in other parts, and mixed with it.

In the Custom-house of Lima I have seen portions of the roots of Huacsaro, and of the other species which are brought by way of Payta and Huayaquil, as well as the capital of Peru, and shipped at Callao for Cadiz; whence it follows that these roots are collected in the provinces of Caxamarca, Huamachuco, Patás, and Chachapoyas, belonging to the Bishopric of Truxillo, and in other places bordering on Huayaquil.

The common method of collecting the roots of the Calagualas is to dig up the plants with a spade, and strip them of the leaves, stalks, shoots, and fibrous parts, leaving only the trunk of the root, which is exposed to the sun, that it may be dried and cleared of the adherent earth: many persons, however, wash the roots before they strip the shoots and fibres; a readier and safer operation for wholly clearing them from the soil, and enabling them to dry sooner, as the fibres are more easily removed when the roots have been washed and half dry, than when they are green and covered with soil.

The drying of all the Calagualas is effected by exposing them to the sun immediately after they have been pulled up and washed; for, on being left some days in the shade, they grow mouldy and lose their due colour and consistency, which they retain when quickly dried in the sun, or, in case of necessity, in stoves or heated ovens, care being taken to turn and move them occasionally, that the moisture exhaling from them may more readily evaporate. The roots of the Puntu-puntu require more than a month's drying in the sun and open air, and the genuine Calaguala some few days less, though its roots are four or five times slenderer than those of the former; but the roots of the Huacsaro, though rather thick, become perfectly dry in three or four days. This remarkable difference proceeds from the slight humidity and viscosity of the Huacsaro, and from the quantity of viscous and very tenacious juice contained in the roots of the Calaguala and the Puntu-puntu, which, when fresh, are extremely tender; while those of the Huacsaro are woody, dry, and hard, scarcely a degree less than when they have been perfectly dried; so that their bulk sustains scarcely any perceptible diminution in drying, while that of the former is reduced one-third. The desiccation of both kinds may be pronounced complete, when they resist cutting or breaking, appear as hard as a stick, and are not to be bent or penetrated by the nails or teeth; but the roots of the Calaguala are easily masticated.

When the collectors find the roots of the Calaguala sufficiently dry, they pack them in leather bags, and without any other care take them to the sea-ports, whence they are forwarded by the traders to Europe, without examining whether they are perfectly dry; which is very seldom the case with those of the Calaguala and the Puntu-puntu, for the reasons already explained.

From negligent or bad preservation proceeds the almost total corruption of the greater part of the Calagualas which we obtain in Spain; and perhaps this may be one of the principal causes why its effects are not equal to those produced in Peru by the genuine Calaguala when used fresh. The deterioration of the roots, though well dried, may also in a great measure arise from the bad practice of packing them in leather bags, which are possessing all the requisites necessary for preventing so serious an injury to mankind, though apparently of slight importance, from the little regard we pay to our health unless when we are sick, and then we are anxious for medical aid, and for the *best* medicine. Dealers and traders in drugs ought to be skilled in distinguishing the good or bad state of what they buy and sell; but the misfortune is, that this trade, which by an order of Government should be carried on solely by apothecaries and druggists, properly qualified and experienced, is in the hands of empirics, who attend only to their own interests; hence the profit derived from the sale of drugs is the main consideration, and not their good or bad quality.

The conveyance of the roots of the Calaguala should be effected after the mode prescribed in my *Quinologia*, in treating of the package of the barks of the *Cascarillas* or Quinas, in chests with the seams or joinings well secured, and covered with dry hide, to prevent all the damages already mentioned.

The roots of the genuine Calaguala, used as such in Peru, scarcely ever occur in European commerce, as those most commonly sold by the druggists and dealers in Cadiz are of the second, or more commonly of the third, species; that is, of the Puntu-puntu and Huacsaro; and even among those of the second, there are usually roots of other species of *Polypodium*, which from their great resemblance to each other are scarcely distinguishable, except by their thickness.

The roots of the genuine Calaguala differ remarkably from those of the second species, or Puntu-puntu, and both differ wholly from the third, which is a species of a genus distinct from the other two; and the roots of the Huacsaro, also, are usually mixed with those of two other species of its own genus. Besides these species of Calaguala sold by our druggists, other roots of very different species are met with, either singly or mixed with each other, and among them two or three as slender as the genuine, from which they are easily distinguishable by their insipid taste.

Probably from these mixtures, and from the very scanty supply of the genuine Calaguala in Spain, has resulted its discredit with almost all the Faculty; many of whom have made experiments with it, hoping to produce the same effects and virtues which are daily observed in Peru: but as they have proceeded without considering or being aware of the mixtures, and without due knowledge and discrimination of the genuine Calaguala, they have unjustly taken up their pens to decry it; and perhaps for the same reasons the Calaguala is excluded from the *materia medica* of Linnæus and from that of Bergius. It always happens that effects follow causes: the Calagualas at present in general use are, as already explained, species very different and distinct from the genuine Calaguala employed in Peru; hence it is not surprising that their effects are widely different.

Various dissertations have been lately written in Italy for and against the Calaguala.* This difference cannot have otherwise arisen than from their experiments being made on roots of distinct species. From scarcely any of the apothecaries, and from none of the druggists of Madrid, have I been able to obtain a single root of the genuine Calaguala, which is generally unknown to the Faculty; and thus, if any one had recourse to the Calagualas sold in Madrid as a remedy in disorders, or for chemical observations and experiments, the failure in the results is to be attributed to no other cause than this.

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* Dr. Gelmetti, a learned physician of Mantua, after various new experiments which he has made and published, recommends the use of the Calaguala for various disorders. Dr. Bassiano Carminati published at Pavia, in 1791, a tract against the Calaguala, entitled, "*Some Researches on the Principles and Virtue of the Root of Calaguala.*"

Most of the Calagualas now sold by the druggists of Madrid, who are supplied from Cadiz, have no perceptible bitter or other taste or smell indicating any virtue ; they are actually almost tasteless ; and if a root of some kind be casually found of a bitter taste, it is so slight as not to merit the least attention, considering the peculiar bitterness of the genuine Calaguala.

From what I have here stated, it is not to be inferred that I aim at excluding from medicine all the roots sold to us for Calagualas, or to maintain that among them there is not any which possesses medicinal virtues ; for it is to be presumed that these do exist in a species which has come into my possession, similar in figure to the great oruga of the Elm and Ash, and whose roots are from two to three inches long and one inch thick, curved, with small protuberances on the lower parts, and covered on the upper with the bases of the shoots, disposed in three or four alternate orders, and of considerable bitterness, but less intense than that of the genuine.

My sole object in this Memoir is to remove the doubts and ambiguities which exist on this matter ; to illustrate, by means of the subjoined descriptions, an exact definition of the genuine Calaguala, and the difference existing between it and the other two species ; and, lastly, to shew that the opinions, experiments, and observations on the virtues of the Calaguala, have not been well founded, and that most of the investigations have proceeded, according to a common expression, blindly, and prejudiced by statements of little or no certainty.

ARTICLE III.

Of the virtues and uses of the genuine Calaguala; of the other two Species admitted as such in commerce; and of the only criterion for remedying the Mixture of other roots with the genuine.

There are few persons who have not some knowledge of the deobstruent virtue of the Calaguala, since in Spain it is generally observable, that when any person receives a blow or a fall, he has recourse to it immediately. The Faculty, though many of them doubt its virtue, and some of them pronounce it to be vain and imaginary, generally prescribe, either before or after bleeding, in case of a blow or a fall, no other medicine than the tincture or decoction of the Calaguala. The Indians and other natives of Peru are convinced that it possesses really great deobstruent, sudorific, anti-venereal, and febrifuge virtues, and to call them in question would be unjust, since they have been proved by the experience of so many years.

Many are persuaded that the family of the *Filices* have few or no virtues, and some have even a more unfavourable opinion, founded on the circumstance of their growing in shady and ill-ventilated spots; but these persons may be reminded of the anthelmintic and emmenagogical virtue of the root of the Fern, *Polypodium Filix mas* Linn., the emollient and pectoral virtue of the *Polypodium vulgare* Linn., the astringent virtue of the Spleenwort, *Asplenium Cæterach* Linn., and the aperient virtue of the Maiden-hair, *Adianthum Capillus veneris:* these, besides growing, like the Calaguala, in airy, pure, and salubrious situations, ought to be excepted from the general rule; and for the same reason their principles must be more analogous to our nature, and of course favourable in their properties and effects, as observation and experience prove.

The genuine Calaguala is universally used in Peru to thin the blood, to promote perspiration, and to mitigate rheumatic and venereal pains. It is frequently used in falls, blows, contusions, and in bodily strains caused by over-exertion, and its efficacy is acknowledged in dispersing internal imposthumes.

I confine myself to these general notices, which I originally collected in Peru, as serving to instruct and enlighten those persons in Europe who frequently attribute very different virtues to the Calaguala; which, in my opinion, do not all merit belief, until they have been proved by experiments and researches made with sound judgement.*

The most common method of using this root in Peru is in decoction or infusion, allowing to every six pints of water one ounce of fresh roots bruised; they boil it on a slow fire in a glazed pot, covered, until the liquid is diminished one half, and without straining, they take out, after it has settled, the quantity to be used each time, either hot or cold, as may be most suitable to the patient. In the morning fasting they are accustomed to take the decoction warm, sweetened with a little sugar; but in the course of the day they drink it *ad libitum*, cold and not sweetened, in syphilis, or for bruises, contusions, and falls, to prevent the probable results of such accidents; as the Faculty say that this specific operates as a powerful deobstruent, solvent, balsamic, and diuretic remedy. The natives of Peru, and even the Faculty themselves, affirm, that much sediment is observed in the urine of persons who have used the decoction of the Calaguala. To employ it green as well as dry, it is not necessary to boil it as is commonly done; it is sufficient only to bruise and infuse it in cold water for a few hours, as it readily yields its bitter and saline extract, especially if care be taken to shake the bottle or vessel in which the infusion is made. The

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* The *Pharmacopœia Matritensis*, printed in 1762, states, that the Calaguala is chiefly used in decoction, though sometimes administered in powder, and that its virtue is aperient, solvent, and sudorific. Don Diego Bravo, already mentioned, affirms in his Dissertation, that this root is one of the most powerful antisyphilitic medicines, when administered in the form of a ptisan; that it is the best deobstruent in medicine, the best specific hitherto met with for the total extirpation of internal and external imposthumes; that it also readily dissipates or dissolves the accumulations of extravasated blood (especially in falls); that it is an excellent hæmoptoic and wonderful emmenagogue, of great effect in jaundice, in affections of the chest, and that it radically removes tertian and quartan agues; that the powder of the Calaguala abates coughing, relieves oppression of the chest, and hoarseness; lastly, that it is diuretic, &c. That it is to be administered in every species of gonorrhœa to heal and cleanse the internal ulcers; that it is given to promote menstruation, facilitate lochia, to solve scirrhous dispositions and grumous concretions of the blood; that it is solvent and expellent; that it assuages the tormenting pains which ensue after delivery, called by the vulgar after-pains; that in the latter cases the women drink the decoction sweetened with honey; that it is used with great advantage in removing pleuritic inflammation, and to facilitate expectoration: in suppurations of the viscera it is taken with great benefit, mixing two ounces of honey and two

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of butter with three pints of the decoction; and in other cases, equal parts are taken of the decoction and asses' milk, or, in defect of that, cows' milk, with great benefit to patients. The Professor adds the various preparations used of the Calaguala; the regimen and method of administering; the results obtained on the analysis which he made of it; the dose; and lastly the experiments and observations, made with great success on different subjects, with the Calaguala, communicated by Don Juan Felix de Andrade, and dispensed by the method of Dr. Peralta, who, according to Bravo, was the first Spaniard who promulgated at Court the admirable virtues of the genuine Calaguala, which was probably that obtained by Bravo and Andrade from Bartholomew de Andrade, who stated to Professor Bravo that he had collected it with his own hands in the hills of Cuzco, as of a superior quality to that of Quito and the other provinces of Peru. In the Appendix to his Dissertation he inserts the operation for separating the essential salt, as he calls it, of the Calaguala, having used the hydraulic machine constructed by Count de la Garaye; and he affirms that the use of this salt, or rather saline extract, produces better and stronger effects than the ptisan and other modes of administering the Calaguala.

case is otherwise with the other two Calagualas, since, after being well bruised, they require a long digestion to enable the water to extract from them the little viscous and other principles of which they consist, being naturally ligneous and very hard when dry: the roots of the Huacsaro are so, even when newly taken from the earth.

The effects of the Calaguala, when used fresh, are perceived to be more prompt and efficacious than when dry; but, when used in the latter state, it does not lose its virtue, as experience has shown in Peru. Every experienced physician well knows, that many dried vegetables, collected and preserved with care and attention, produce equal effects as when used fresh, but operating less quickly. There are many plants which, after drying, provided due skill and care have been used in preserving them, impart to water or other liquids all their principles with greater facility than when they are fresh, and consequently produce better effects. I have no doubt that the root of the Calaguala, administered in powder as is the practice with some, will be equally effectual as when taken in infusion or decoction; yet I shall prefer using the infusion or saline extract, well elaborated, so long as the experience and observations of eminent professional men do not decide otherwise.

From the account I have just given, it must be inferred that the virtues of the genuine Calaguala are not so imaginary as some physicians have supposed, who, influenced by groundless reasonings and statements, have judged so unfavourably of a medicine, which for a series of years, in Peru, has been proved to produce the results already stated; wherefore, in my opinion, a too credulous physician is equally to blame with the incredulous; since the former ought to require more than a superficial knowledge of the virtue of a simple or compound, in order not to err in using it; nor is it proper in the latter to depreciate such knowledge without previously ascertaining the truth or discovering the fallacy, by means of experiments and observations, undertaken with a clear and distinct knowledge of the medicine itself, of the state in which it is found, and of its constituent principles; because, without these premises, reason may convince us how uncertain all the experiments must be which we may try for ascertaining the virtues and uses of any substance whatever.

In order to remedy the mixtures made of other roots with those of the genuine Calaguala, it appears to me that the only obvious and practicable method for the present, is, that the traders and merchants of Cadiz, as well as other individuals or companies, should charge their correspondents in Peru, to take care that in those regions the very roots of the Calaguala should be collected which are sold fresh in the Square of Lima, and that there be left to each root, or to most of them, a leaf, which may serve as a criterion for the identity of the species, until such time, as our merchants, druggists, and professional men, have acquired such skill in distinguishing it, as not to require an indication which is at present so important and necessary.

ARTICLE IV.

Of the difference between the Genuine Calaguala and the other Roots with which it is confounded, and of the Reasons that exist for adopting the vulgar Names of Calaguala *and* Huacsaro.

The *Polypodium Calaguala* is a very different species from any of the *Polypodia* mentioned by Linnæus in his *Species Plantarum*. It approaches nearest to the *Polypodium lanceolatum* of that author, or to the *Phyllitis, folio longo, angustifolia, masculis majoribus* of Petiver *Filic*. 8. tab. 6. fig. 2. differs from the latter in this respect, that the spots of fructification do not pass beyond the middle of the frond, and are disposed in two lines in a quincunx order; that is, some of the spots are alternately contiguous to the principal nerve of the frond, the rest of the spots are a little distant from it; so that they form two lines, one resting on the nerve, the other somewhat remote. The spots of fructification in P. *lanceolatum*, on the contrary, are placed in two parallel lines along the whole of the frond; that is, on each side of the nerve there is only one line of sori, as is illustrated in the figure of Petiver. Calaguala likewise differs in the margins of the fronds being revolute, and the stipes being covered with small squamæ, which marks are wanting in P. *lanceolatum*. Though in some narrow frond of the Calaguala only one line of sori is observable on each side of the midrib, and also in the broadest fronds, which proceed from the same root with the narrow and middle-sized, some of the sori are seen to deviate towards the margin of the frond out of the regular line, they never occupy the whole length of the frond, as in P. *lan-*

ceolatum, but in general only the half of the frond; and if they should exceed that, the additional space is so short as to be unworthy of notice, and at least one-third of the frond in the lower part is destitute of sori.

The *Polypodium Phyllitidis* of Linn., considered by some as the genuine Calaguala, differs from it in having narrower and proportionably shorter fronds. They also abound in transverse nerves, which are wanting in those of the Calaguala, in which their place is supplied by branching veins which are not readily distinguishable, and are quite different from the short lateral nerves commonly met with in other species of *Polypodium* with simple fronds. The sori of *Polypodium Phyllitidis* are scattered over the whole under surface of the frond, as Linnæus observes in his *Species Plant*. 1543, and as they are represented in the figure of Petiver, *Filic*. 5. p. 6. f. 10, and by Quer in *Flora Espan*. tom. 6. p. 124. fig. 12.

The Puntu-puntu, which is the second species of Calaguala brought to us from Peru, and which most resembles the P. *Americanum* of Quer, differs from the latter in the greater size and thickness of its fronds, and in its form not being so perfectly lanceolate. The spots of the fructification are successive, that is, between the transverse nerves there is no more than one series of sori, whereas in P. *Americanum* there are two consistent series; and finally the fructifications do not occupy the whole under surface of the fronds, as in those of the latter according to the plate of Quer, who reduced this species to the P. *Phyllitidis* of Linn.; and my Puntu-puntu corresponds exactly with the definition given by this author of *Polypodium crassifolium*, and with the figure of the *Phyllitidis maculata*, amplissimo folio of Petiver, *Fil*. 1. p. 6. f. 8. The third species of root which is brought from Peru under the name of Calaguala, is a new species of

Acrostichum, belonging to the division of Linnæus, with simple fronds, which differs entirely from the Calaguala, the Puntupuntu, and all the other roots which are not species of the same genus. All others who have treated of the Calaguala have differed in the description which they have given of it; a proof that they have spoken solely from information regarding the genuine Calaguala, and this information is very doubtful, or applicable to various species of *Polypodium*.

Although the Indian words *Cchallahuala*, or *Calaguala*, as it is now written, and *Huacsaro*, are familiar only to a few persons, and those Americans, I have thought proper to adopt the first as the trivial name of the *Polypodium*, and the second as that of the *Acrostichum*; naming the former species *Polypodium Calaguala*, and the latter, *Acrostichum Huacsaro*, it appearing that these Indian words originate from concurrent indications in the plants themselves, as I have before shown.

ARTICLE V.

Description of the Polypodium Calaguala, which ought to be used in medicine.

CLASS XXIV.

Filices.——Polypodium Calaguala.

P. frondibus lanceolatis integerrimis: marginibus revolutis, fructificationibus a medio ad apicem in quincuncem dispositis, solitariis, parallelis. *Flor. Per. edend. cum Icon.**

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* As the Calaguala is not to be published in the Flora of Peru and Chili, according to the order observed in the publications; and as the plate will not be given before the last volume of

P. (*Calaguala*)—Leaves lanceolate, very entire, margins revolute; spots of fructification disposed in a quincunx, solitary and parallel.

Root—Round, somewhat compressed, slender, horizontal, creeping and flexuose, covered on the under surface with long, branching, dark-grey fibres, and on the upper surface with fronds disposed in two rows alternating with each other; of an ash colour on the exterior side, and covered almost throughout with spreading scales, and on the interior of a bright green colour, furnished with many small nerves, which extend throughout its centre. After slow desiccation it becomes on its exterior surface of a dark ash colour, after the scales or scurf have been removed, and when cut it exhibits in the interior a compact substance, in some degree resembling that of the sugar-cane or citron, and of a pale straw colour more or less intense. The taste is at first sweet, followed by a strong disagreeable bitter, somewhat viscid. It may readily be masticated without any resistance; at the time of mastication, when cleared, it exhales a kind of rancid oily odour.

Fronds—Disposed alternately in two series, varying in length from half a foot to a foot high, and from three to seven lines wide in the middle; stiff, lanceolate, somewhat curved, very entire, naked, firm, and very juicy; without transversal nerves, having instead of them indistinct branchy veins, shining, margins revolute, covered on the anterior surface with whitish dots, and on the posterior side with fructification from the middle to the apex in those fronds which have attained their full size; from the middle downwards is destitute of them. In the young

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the above work, the present anticipation of the Plate in this Memoir, has been permitted by the Minister of the Indies, in order that Naturalists as well as the Professors of the three branches of medicine, might be made distinctly acquainted with the Plate.

and half-grown fronds fructification never occurs. Stipes naked, rather shorter than the frond, plain on the anterior surface, and furrowed towards the base, the ridge of the posterior side extending to the termination of the frond along its midrib.

Fructification—Disposed in little round spots, from the middle of the frond to its apex, in two lines in quincunx order, or alternately deviating from the line towards the margin. The spots before the capsules can be readily distinguished with a microscope, are of a brown chesnut colour, smaller by half than when the spots have attained their full growth, in which state they are of a red chesnut colour, and sometimes tawny, about the size of half a lentil: each spot consists of more than seventy capsules, attached to a receptaculum covered with very short hairs.

Capsules—very short; pedicels orbicular, convex on both sides, and somewhat compressed, about the size of half a grain of mustard, thin, paper-like, whitish; surrounded almost wholly by an annular membrane, which bursts elastically, near the insertion of the piece, into two valves, appearing like the skin of a grub or maggot.

Seeds—numerous, very minute, oval, shining, whitish with a tinge of yellow, attached internally to the annular membrane, from which they spring elastically on the bursting of the valves.

Observation.—For want of a good microscope, I was prevented from deciding on the fructification of both sexes, which I suspect occurs in the genus ***Polypodium***, as well as in ***Acrostichum***; because, with a common lens, two different bodies are distinguishable, in some of which capsules are observable, in others they remain as if blasted, and scarcely perceptible.

It grows abundantly in the hollows of the Punas, and on the cold mountainous regions of the provinces of Canta, Huarocheri, Caxatambo, Tarma, Xauxa, Huancavelica, Huamanga, Cuzco, Huanuco, Huamalies, Caxamarca, and other parts of the kingdom of Peru, and in the neighbourhood of the lakes of Lauricocha, Yauricocha, and Chinchaycocha, all situated in the province of Tarma; the first scarcely ten leagues distant from the second, and the third only four leagues. Yet the waters which flow from them, and give rise to the three celebrated rivers, Marañon, Huallaga, and Ucayali, run in a winding direction for an immense distance, and after a course round our extensive mountains and those of the natives, the second, which is navigable for boats and canoes from the strand of the town of Cuchero, distant ninety-five leagues from Lima, unites with the first in the countries of the Chamicuros and Marinas Indians, and the third with them in those of the Omaguas Indians.

It is found throughout the year with fructificatioas or protuberances, which in all their states are without integuments.

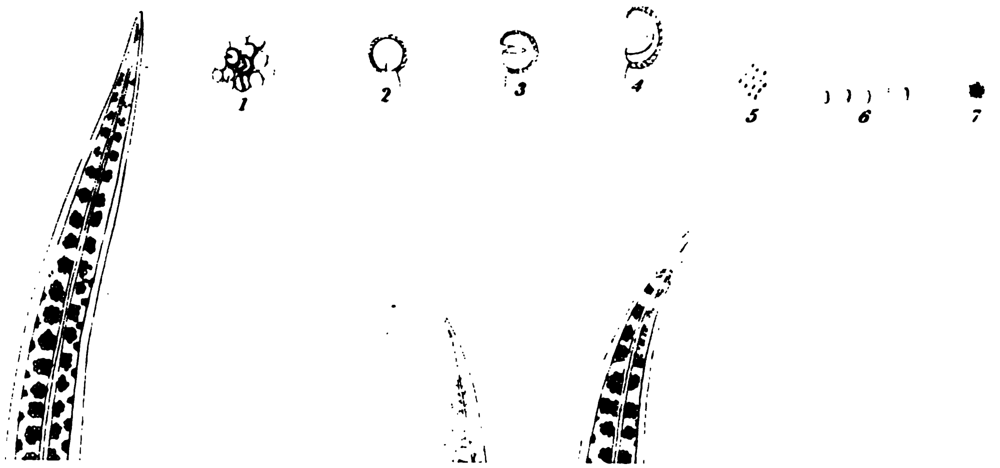
The Indians give it the name of *Ccallahuala*, and the Spaniards that of *fine Calaguala*.

OBSERVATIONS.

Having taken a scruple of this root well bruised, I infused it in three ounces of distilled water, which in a short time was tinged of a clear red colour; in two hours it became of a clear chesnut; but though I kept it two hours longer in cold infusion, and shook the vessel from time to time, I perceived no farther change in the tint. The flavour of the infusion proved sufficiently bitter. The oily rancid odour perceptible after bruising the root of the Calaguala, was entirely dissipated, and only a slight scent proceeded from the infusion. When treated with sulphate of iron, the chesnut colour changed to a greenish blue, an indication that the root contains an astringent principle. The tincture of galls poured on the infusion did not alter it in the slightest degree. The substances soluble in water being extracted, I proceeded to examine whether it contained any resinous principle; for which purpose, after having dried the residuum, I infused it in an ounce of rectified spirit of wine. After an infusion of forty-eight hours, it acquired no tincture whatever; nor, when poured into water, did it give any indication of resin; no froth arose, as is the case with saponaceous substances; on the contrary, the foam immediately subsided, which I produced by repeatedly shaking with violence the infusion in the distilled water.

EXPLANATION OF THE PLATE.

1. Sorus of fructification magnified.
2. A capsule very highly magnified, closed with its annular appendage.
3. A very highly magnified capsule just opening, with its very short pedicel.
4. A capsule entirely open.
5. Seeds.
6. Seed magnified.
7. Receptacle magnified.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DESCRIPTION

OF THE

THICK CALAGUALA, OR PUNTU-PUNTU.

POLYPODIUM CRASSIFOLIUM.

P. *frondibus lanceolatis integerrimis subundulatis, fructificationibus serialibus a medio ferè ad apicem.* Flor. Peruv. edend. cum Icon.

P. *(crassifolium) frondibus lanceolatis glabris integerrimis, fructificationibus serialibus.* Linn. Sp. Plant. 1543.

Phyllitis *maculata, amplissimo folio.* Petiv. Fil. p. 6. fig. 8.

Polypodium (thick-leaved)—Fronds lanceolate, very entire, slightly undulated; fructifications disposed in transversal lines from the middle to the apex of the frond.

Root—Round, somewhat compressed, long and thick, horizontal, fragile, of a pale or bright green colour, covered with membranous scales which commonly fall off at the time of desiccation, covered on the upper surface with fronds, and on the under side with woolly fibres, which separate readily from the principal root after drying.

Fronds—Disposed in two series along the whole root, and alternating with each other, from a quarter to more than a vara (yard) in length, and from one to three inches broad, lanceolate, plain, slightly undulated at the margins, very entire, thick, stiff, fragile, naked, and shining, covered on the upper surface with minute pellucid dots, the under side horizontally nerved, and covered with fructifications from the middle upwards, though in some fronds they descend within two or three inches of the base.

Stipes—long, semicylindrical, naked, and shining, channelled on the upper side.

Fructification—In round spots, naked, about the size and shape of a lentil, disposed in transversal simple lines, that is, between the transversal nerves.

Capsules—Many in each spot, pedicelled, and in all respects similar to those of the preceding species, but smaller, interspersed with hairs and filled with very small oval seeds.

Grows—In the mountains and woods of the provinces of Tarma, Panatahuas, and others in warm situations on gravelly and rocky grounds destitute of trees.

It is found in fructification throughout the year. The Indians denominate it *Puntu-puntu*, and some Creoles call it *Deer's tongue*. In commerce and with the apothecaries it is distinguished from the first and the following by the designation of *thick Calaguala*.

Uses—The natives of Peru use the decoction of Puntu-puntu as a sudorific in pains of the side.

OBSERVATION.

The cold infusion and the decoction of this root, made in glass vessels with distilled water, assume a clear red. The flavour both of the infusion and decoction, and of the root itself when masticated, is somewhat viscous, with a degree of sweetness by no means unpleasant, and without the slightest bitter. The infusion and decoction treated with sulphate of iron manifest a very slight alteration.

NOTE.

The roots of the Puntu-puntu, after being slowly dried, are reduced to a fourth part of their thickness when fresh, wrinkled, or furrowed, forming tortuosities or undulations which they had not before, somewhat compact, heavy, and equal on cutting, having on the lower part very small protuberances proceeding from the fibres, and on the superior covered with the bases or insertions of the stalks, which are disposed in two ranges, and nearly of a circular figure: externally they are of a rusty and rather chesnut colour, and internally of a clear red, with some whitish little nerves which cross them longitudinally; they have no perceptible odour, and the flavour is somewhat sweet and glutinous. The root, on being masticated for some time, grows spongy, and causes, when chewed, a certain harsh sound between the teeth. Choice should be made of the most compact, heavy, difficult to cut, and of even fracture, red within, and rusty or chesnut coloured without. Little value is to be placed on that which is light in weight, spongy, blackish, decayed, or worm-eaten, and which cuts easily or unequally.

DESCRIPTION
OF THE
CALAGUALA MEDIANA;
(THE CORDONCILLO, OR THE LITTLE CORD.)

ACROSTICHUM HUACSARO.

A. *frondibus lanceolato-linearibus integerrimis, fructiferis angustioribus prominulis.* Flor. Peruv. edend. cum Icon.

Plant—Cæspitose.

Root—Horizontal, creeping, branched, about two feet long, of the thickness of a finger, furnished with numerous slender fibres; surrounded by the stipes, which mutually fold over each other, so as to form a cord or braid, of a dark grey colour without, and a dark tawny within.

Fronds—Numerous on the whole circumference of the root, and erect by means of the upward curvature of the stipes disposed in two rows, linear-lanceolate, very entire, slightly undulated on the margins, scarcely juicy, rigid, smooth and shining, and with the mid-rib carinated on both sides of the frond, sharper on the posterior side. Sterile fronds flat, more than half a yard (vara) long, fertile ones narrower, almost double the length, at first revolute and carinated, afterwards straight and flat.

less perfect, twice as thick as a common quill, and of rather compact consistence, but far from heavy, and hard to cut, either when dry or newly pulled from the earth, being naturally dry and of no manifest viscosity; on the exterior they are of a dark grey with some thin blackish scales, and within of a dark tawny approaching to red; when cut horizontally they exhibit six or more whitish points between the centre and the circumference, which correspond to as many little nerves which traverse it lengthwise. No odour is perceptible in them except an earthy and musty scent, very feeble, and the taste somewhat harsh and astringent, though not at all unpleasant.

MEMOIR
ON THE
VIRTUES AND USES OF THE ROOT
OF
THE PLANT CALLED YALLHOY,
IN PERU.

BY DON HIPPOLITO RUIZ,

FIRST BOTANIST TO HIS MAJESTY IN THE EXPEDITION TO PERU,
&c. &c. &c.

PRELIMINARY NOTICE.

THE inaptitude of the remedies commonly applied to the cure of dysenteries, and the powerful antidote discovered in the root of the plant called *Yallhoy* for these severe disorders, encouraged me to write the present Memoir, with the object of publishing it for the general good. For the fulfilment of my wish, I presented it to the Royal Medical Academy of Madrid, in order that this learned body might examine it with their wonted critical attention, and, if it incited their approbation, might insert it in the second volume of their Transactions. The Academy, after ordering some experiments to be made, approved it, and permitted it to be incorporated in that volume, with other Memoirs intended for the press; but the publication of the second volume being unavoidably retarded, and the Royal Academy desiring that this Memoir should appear as soon as possible, favoured me with the necessary certificate for publishing it on my own account, as I now do, for the general benefit.

Any discovery in the vegetable kingdom, of qualities capable of supplying the first necessities, or curing the disorders incident to human nature, is certainly of greater value than a hundred discoveries of no known utility.

One of the first and most estimable is the plant called in Peru *Yallhoy*,[*] and known in other parts of that kingdom by the name of *Masca*,[†] the bark of whose roots presents many medicinal and economic virtues.

The abundant foam, similar to that of soap, which is yielded by the fresh and dry barks of the Yallhoy when pounded and infused in hot or cold water, and shaken slightly or for a long time, shews that there exists in these barks a great proportion of saponaceous matter.

This indication is in some degree proved by the circumstance of these barks being used as a substitute for soap in washing and cleansing linen of all kinds. For this purpose the fresh bark of the roots of the Yallhoy, is well pounded and moulded into balls, which are sold in the shops and great Square of Huanuco; and the dry barks are also sold in the markets for the same purpose.

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[*] Signifying to cleanse filth or impurities.

[†] Equivalent to tassel; thus *mascapaycha* means the regal tassel of the Incas.

The natives of the province of Huanuco, and the Indians of the mountains of the Peruvian Andes, make use of these barks for washing the head and for cleansing it from dirt and scurf, from a persuasion (particularly among the fair sex) that with this lotion the hair is nourished, and acquires greater softness, flexibility, and lustre. This fact is well founded in theory; and experience has fully demonstrated it by the long and beautiful hair generally observable in those persons who make frequent use of such lotions.

For the same purpose of cleansing the hair, the inhabitants of the province of Tarma, as long ago as the year 1797, used the barks of the root of another species of the genus ***Monnina***, denominated in that country ***Pahuata-huinac*** and ***Chissip-huinac***, that is, ***Growing by night***, and also ***Hacchiquis***; all which is intimated in the first volume of our ***Systema Vegetabilium Floræ Peruvianæ et Chilensis***, page 172, at the end of the specific definition of the ***Monnina salicifolia***.

In the city of Huanuco the barks of the Yallhoy are frequently used for cleansing and polishing wrought silver; and the silversmiths hold it in great estimation for that purpose.

From the different sensations excited on the palate and tongue, on chewing the barks of the Yallhoy, from their sharp, acrid, acid, bitter, mucilaginous, saponaceous, and somewhat nauseous taste, it is to be inferred that they contain many specific virtues.

To be able to ascertain them, it is necessary to avail ourselves of those excellent rules prescribed for us by the reformer of botany in the immortal philosophy of this science, and, after well considering them, to proceed to a pharmaceutico-chemical analysis of its parts, in order to deduce from the most obvious principles manifested by that analysis, the qualities and properties of the plant, availing ourselves also of the analogy which it possesses with other vegetables whose properties are known.

It sometimes occurs, that in the urgent necessity for alleviating pain, man is obliged to use whatever remedy he imagines efficacious; and without reflecting on the ill consequences that may ensue, he affords to the scientific observer considerable light for pursuing his investigations with greater certainty and promptitude.

Such has been the case with the first trials of this new remedy of the Yallhoy; because the Faculty in Huanuco, finding that none of the remedies in medical use were adequate to arrest the fatal progress of an epidemical dysentery which prevailed in that city in the years 1788 and 1789, prescribed clysters of the decoction of barks of the root of the Yallhoy. They were induced to do this by observing that the natives already used the bark with success for evacuating the intestines when affected with irritating diarrhœas. Observing the good effects resulting from these clysters, the Faculty made a further step, and administered internally the infusion of a small quantity of the barks made in hot water.

By these aids a considerable amelioration was observed to take place among the sick in a few days; and by frequent use the Physicians succeeded in radically curing the epidemic, to their own great satisfaction, and to the admiration of all persons.

Since that period the Physicians in Peru have preferred the bark of the root Yallhoy to that of the *Simarouba* or *Quassia* of Linnæus, as a cure for dysenteries; and some of them, reasoning solely from the effects produced by these barks, give them the improper name of *Simarouba Peruviana*, which ought not to be adopted in medical use; because, though they agree in their effects, yet being plants of distinct classes both naturally and artificially, the common term would in time occasion much doubt and confusion in *materia medica*; wherefore the terms *Monnina polystachya* and *Yallhoy* should always be employed to designate the genuine anti-dysenteric plant of Peru.

It being the province of a botanist to establish permanently the exact knowledge and distinction of any vegetable which he may discover, by means of a complete description, and to deduce its properties and virtues from the affinity which the new vegetable may hold in class, order, and genus, with those already known; from the flavour, odour, colour, and habitat; from the most remarkable principles and substances ascertained by pharmaceutico-chemical analysis, and from information obtained from the natives of the country where the plant spontaneously grows; and finally from observations of his own, made with great care and attention; I believe that on my part the obligation of the botanist is in some measure discharged in this short dissertation, with the methodical and historical description which I give of the plant, with a diagnosis of the characters found in the bark of its roots, and with an exposition of those substances and principles, found in it, by means of a chemical analysis performed (as the root is inodorous) in the humid way, as preferable, and less exposed than in the dry way to the disadvantage of having its principles decomposed or destroyed by fire; and of obtaining in the result, substances and combinations distinct from those which nature in her wisdom has deposited in that part of the plant.

From the greater affinity which, in relation to other plants hitherto known, the genus *Monnina* possesses with the genus *Polygala,** it must be inferred that the virtues of the Yallhoy coincide with those of the roots of the *Polygala Senega* of Linnæus, and, like them, may serve as a deobstruent in obstructions of the lungs and other viscera, as a cure for dropsy, asthma, and other disorders in which use is made of the *Polygala Senega*, which is a plant seldom sold in Spain.

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* From the incomplete descriptions that authors have as yet given us, who have treated of the *Polygala Senega*, it cannot be decided with certainty that this plant belongs to the genus *Monnina*. But from the characters exhibited in the plates given of the former by Miller in his *Dictionary*, tom. 3. tab. 5. and by Count Castiglioni in his *History of Foreign Plants*, tom. 3.

To decide this well-founded conjecture, Physicians should make a diligent and attentive use and application of the bark, in order that medical experience and observation may prove it satisfactorily.

If, as I hope, the bark of the Yallhoy operate in Europe with the same effects which it produces in Peru against dysentery, and if it likewise be found to possess the properties attributed to the *Polygala Senega*, the catalogue of Materia Medica will be enriched by the addition of this new and powerful remedy.

With this view I submit to the Royal Medical Academy of Madrid the present Memoir, hoping that its learned members will, with their accustomed zeal, perfect and rectify a work so important to the welfare of humanity, which was begun but not concluded with due critical accuracy in Peru, and which I cannot accomplish satisfactorily myself.

Henceforward there is reason to hope, that as the admirable styptic of the *Ratanhia*,[†] or *Krameria triandra*, sanctioned by

p. 177. tab. 70, it is very probable that the *Polygala Senega* is a species of *Monnina*[*], as are also, I suspect, various other species which botanists have classed and confounded among the *Polygalas*, as will be stated in the sixth volume of the *Flora Peruviana et Chilensis*, when we treat of both genera in that work.

[†] Besides the virtues of the extract of Ratanhia, mentioned in the dissertation which I published on that specific, it has been latterly observed by some of the Faculty, that it includes a certain tonic virtue which renders it still more estimable and worthy the attention of medical men. It has also been found that a cataplasm of Ratanhia operates powerfully on tu-

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[*] Of this genus M. Bonpland has described sixteen species under the name of *Hebiandra* in *Mag. Natur. Freunde Zu Berlin*, 1808, which, with several new ones in the Lambertian Herbarium from Don Jose Pavon, may increase the number of species to twenty-four. A careful examination of the fructification of *Polygala Senega*, proves that it does not belong to *Monnina*, as conjectured by M. Ruiz. It, however, ought to form, perhaps, with some others, a genus distinct from *Polygala*. There are in the Lambertian Herbarium from Pavon twenty-three species of this latter genus, chiefly from Mexico. The genus *Monnina* is never met with in the colder or elevated regions.—Edit.

the Royal Medical Academy of Madrid spread rapidly through Spain, and through many other parts of Europe, the use of the barks of the Yallhoy will be likewise propagated among all nations.

Every day new productions are announced to us by Naturalists, but we seldom attain the main object, of having their qualities, virtues, and applications made known; and therefore a useful discovery, like that of the root of Yallhoy, in economy and medicine, ought to be more prized than an infinite number of discoveries of no known use.

For this reason it is proper that the use of this new production should be established and propagated as a precious remedy against dysenteries, which are sometimes so afflicting to human nature.

mours, resolving and restoring tone to those debilitated and relaxed parts. And lastly it has been known to correct and cure all kinds of ulcers, when applied to them in light plasters.

It is somewhat difficult to divest some professional men, of the vulgar and false notions that the extracts are a useless medley. Natural reason dictates, and sound chemistry proves to us, that in well elaborated extracts, as much as in good doctrines, the virtue of the vegetable resides; and when plants are inodorous, or have little smell, it is indisputable that the extracts of them contain all or nearly all their virtues, as is proved by the extracts of opium, nettles, aloes, rhubarb, &c. with the additional advantage of being available in a small compass, and in pills, when the stomach of the patient will admit neither decoctions nor infusions hot or cold. The extract of Ratanhia operates with greater efficacy, exhibited in all the prescribed modes, than decoctions of the root from which it is extracted. Want of experience in administering the extract of *Ratanhia* has obliged some practitioners to suspend the application of this very powerful medicine, because its styptic virtue and bitterness are generally repugnant to the patient, or because he usually vomits the first doses given to him; wherefore it appears to me worthy of notice in this place, that, although at first there may be some repugnance on the part of the patient, or he may involuntarily eject the first doses, it is necessary to persevere in repeating them, because the result seldom fails to be, as others of the faculty have experienced, that the stomach will retain the fourth and succeeding doses, especially if the patient immediately chew a little lemon, and drink and gargle with vinegar, diluted in two parts of common water; and if the object be not thus attained, let the extract be given in pills with the same corrective, and the desired result will be obtained.

The more valuable a medicine is, the simpler and less complicated is its exhibition. In the bark of the Yallhoy we have this advantage, because, to ensure its good effects, it is not necessary to mix or combine it with other simples or compounds, which might perhaps alter, lessen, or destroy its virtues, as is proved with respect to the Yallhoy, as well as other powerful remedies, especially the styptic of Ratanhia already mentioned, which operates alone with greater efficacy in bloody fluxes, than when mixed with the different astringents which it has been the practice of some Physicians, perhaps unnecessarily, to add to it. Therefore, until this matter shall be further illustrated by experience, I propose for the dispensation of this new remedy the following formulæ :—

Anti-dysenteric Infusion of Yallhoy.

Take of the barks of the Yallhoy	1 drachm and a half,
Common water, boiling	1 pint :

The barks, well bruised, must be infused in a jar or earthen vessel closed up for an hour, to be shaken occasionally. When almost cold, it may be filtered off for two doses.

Anti-dysenteric Powders of Yallhoy.

Take of very fine powdered bark of Yallhoy	1 scruple,
Common sugar	1 drachm ;

Let them be mixed together for one dose.

Anti-dysenteric Pills of Yallhoy.

Take very fine powdered bark of Yallhoy ·· 1 scruple ;
Let it be mixed with gum tragacanth for one dose.

Anti-dysenteric Pills of Extract of Yallhoy.

Take extract of Yallhoy ·· ·· ·· ·· ·· half a scruple:
Form pills with gum tragacanth for one dose.

Anti-dysenteric Clyster of Yallhoy.

Take dry bark of Yallhoy well bruised ·· half an ounce,
Common water ·· ·· ·· ·· ·· ·· ·· ·· ·· ·· ·· ·· two pints:
Boil in a close vessel till a fourth part of the liquor be consumed; then strain it through a linen cloth, for two clysters.

The Physicians of Huanuco usually prescribe as many as three doses a day of the infusion, and two clysters, ordering at discretion the quantities of bark which the case may seem to require.

Having been unable to ascertain correctly the determinate quantities allowed by those Physicians for infusions and clysters, I have proposed, as already stated, for the dispensation of this new medicine, the above formulæ, as most conformable to other medicines now in use, until they shall be regulated by experience, and proper proof shall decide the doses to be daily administered.*

I have excluded, as useless for medicinal purposes, the ligneous part of the root of the Yallhoy, having found in it no perceptible smell, juice, or substance of any kind analogous with those found in the barks.

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* Doctor Thomas Garcia Suelto has been commissioned by the Royal Medical Academy of Madrid to make experiments with this new anti-dysenteric remedy in the General Hospital of that metropolis, and has reported to the Academy, that he has cured with this medicine two patients who were afflicted with dysentery; that he followed the method proposed in this dissertation ordered to be published in the second volume of the Academical Transactions. I have also received communications from Doctors Ignacio Ruiz of Luzuriaga, and Eugenio de Arrieta, stating that the Yallhoy has operated promptly and efficaciously in various cases in which they have dispensed this new anti-dysenteric remedy in the quantities and the method above prescribed.

Results obtained from the bark of Yallhoy by the following Analysis.

1. I placed in a flask, capable of containing four pints, twenty-four grains of very fine powdered bark of the root of Yallhoy, with six ounces of cold distilled water, and having shaken it for a short time, the liquor was converted into a thick foam occupying the whole cavity of the flask. The foam remained in that state for a considerable time, and though after opening the flask it began to subside less slowly than when the flask was closed, and to re-assume the liquid state, the whole did not entirely subside within the flask, even for the space of twelve hours; but having placed the fluid in an open dish, all the foam disappeared in two minutes, doubtless from the greater influence of oxygen upon the liquor when exposed to the action of the atmosphere, than when kept close. I returned the liquor again into the flask, and as often as the operation was repeated, there resulted the same quantity of foam and the same consequences. All which proves the existence of a portion of saponaceous matter in the bark.

The liquor dissolved more than half the weight of the bark, and assumed a tint similar to that of depurated whey when filtered without clarification; and having added a little carbonate of potash, it acquired a yellow colour, similar to the ***Reseda luteola*** or woad. With sulphate of iron there was no remarkable alteration in the colour, nor any precipitate at the time; but in a few minutes a mucous and greyish matter settled at the bottom of the vessel, and the liquor remained clear. In the residue the acrid bitter flavour was perceptible, though in a slight degree.

2. I infused for three days other twenty-four grains of the powders in an ounce of alcohol, cold. The liquor was in a short time tinged of a clear yellow, and acquired a very perceptible bitter and sharp acrid taste, like that of the root when chewed. During the three days no foam was perceived; notwithstanding the liquor being shaken. The tincture, when diluted in distilled water, did not become turbid, nor was there any perceptible sediment.

The alcohol dissolved half the weight of the powders, and they remained insipid. The excess in weight of the powders in the former dissolution, shows that the alcohol could not dissolve the mucilage that was soluble by the water.

3. I infused half an ounce of the powders in four pints of cold distilled water; after twelve hours I caused it to boil a considerable time in a suitable vessel without luting the junctures; when taken from the fire and sufficiently cooled, I strained and filtered it; and the result was a yellowish tincture, like that produced by the infusion in alcohol. The liquor being evaporated, yielded a drachm and a half of extract of solid consistency, without any adhesive property, shining, and of a dark grey colour, somewhat resembling the resin of jalap, which in a few days became much harder, lost some of its lustre, and remained friable and not so dark coloured.

4. From another half ounce of the powders I obtained, after repeated cold infusions, a pale gold-coloured tincture, which when evaporated yielded three drachms of extract, less shining when dry than before, and laminated, but equally friable after some days, and of a rather ashy grey.

5. Having burnt half an ounce of bark, it was with difficulty reduced to ashes of a blackish colour, until they were consumed to half a scruple, when they became somewhat white. They

contained little calcareous matter, some magnesia, and a small portion of silex.

6. Though no aroma or fragrance of any kind was perceptible in the barks, I placed two ounces of them for distillation in water, to ascertain if they contained any essential oil; and though I purified the distillation, nothing was observable on the surface of the water when placed in a narrow-necked vessel.

7. From what is here stated the result is, that in the barks of the root of the Yallhoy the extractive principle is most abundant, and in it resides the stimulant virtue perceptible in the bark itself; that this extractive principle is mixed with a little mucilage, for which reason at first the acrid flavour is not noticed, which is afterwards experienced on chewing the root, and which is subsequently manifested when after dilution of the mucilage the extractive principle is separated. For the same reason the acrid bitter flavour is not perceptible in the aqueous as in the spirituous infusions, because in the former the two principles remain united, and in the latter the extract alone is disengaged.

8. That the stimulus and the virtues of the bark reside in the extractive principle, is proved by its property of dissolving in water, and in pure spirit of wine or alcohol, and by its facility of oxygenization; since on adding a few drops of nitric acid to a little of the infusion, its colour changed after some time; and it is already known, that the extractive principle is that which suffers most modifications by the oxygen, taking regularly a duller colour when exposed to the open air.

9. I lastly proceeded to examine the extract, for the purpose of ascertaining whether (as I suspected) the extractive principle abounded in it. I remarked that a portion of it did not dissolve in water; and as I was sure that this residuum was not burnt,

and was not of a carbonaceous nature, since the greater part of it dissolved in alcohol, my suspicion was realized by means of ammoniac and the solution of zinc, which precipitated it in foliaceous flakes of a dark colour.

Diagnostic characters which good and well selected Bark of Yallhoy ought to possess.

It is to be remembered, that the barks of the root of the Yallhoy are to be entirely separated from the ligneous part in sticks or little tubes, from a sixth to half a yard in length, and they are to possess the following characteristics, when well collected and preserved.

Thickness of the tubes—from half an inch to two inches in circumference, and the edges rolled inwards one over another, and sometimes each by itself, forming in this case a double or fluted cane.

Surface—longitudinally furrowed, by a few fissures, caused by the separation of the little roots which were in those parts.

Exterior colour—between a straw and bay colour, and mostly with clear greyish spots.

Interior colour—dark tawny. The liber of a pale white. The powder, of a whitish yellow colour.

The liber—from half a line to a line in thickness.

Consistence—compact, like a thin cake of common glue.

Fracture or cutting—of considerable resistance, and equal, without being torn or fibrous at the edges.

Specific gravity—with respect to the consistence, somewhat considerable.

Concrete juice—abundant and glutinous.

Smell—earthy, weak, not unpleasant; but when reduced to powder and taken into the nostrils, it stimulates actively, so as to cause sneezing, and abundantly promotes the mucous discharge.

Taste—sharply acrid, acid, bitter, so soapy and mucilaginous, that on chewing a little of the bark the mouth is filled with a thick viscous and tenacious froth, especially on the lips, the acrimony remaining a long time both on the tongue and palate, so as in some degree to excite nausea.

DESCRIPTIO BOTANICA YALLHOY.

CLASS XVII.

DIADELPHIA OCTANDRIA.

MONNINA.

Syst. Veget. Flor. Per. et Chil. p. 169.

Monnina polystachya.

M. foliis ovato-lanceolatis ovatisque, paniculis polystachyis, drupis apteris. *Syst. Veg. Flor. Peruv. et Chil. p.* 171.

Planta—fruticosa, villosa.

Radix—bipedalis, perpendicularis, simplex, fusiformis, supernè, 1-2-pollicaris, infernè sensim angustata, albido-pallescens, paucis

fibrillis, remotis, tenuibus, longis, meditullio lignoso, albido, subinsipido, facilius à cortice secedente. Cortex crassitudine ut plurimum bilineari, dum siccus characteribus supra dictis præditus.

Caulis—erectus, 2-3-ulnaris, teres, infernè indivisus, supernè ramosus.

Rami—teretes, flexuosi, diffusi, nutantes: teneri villosissimi, parum purpurei, foliosi.

Folia—alterna, patentia, petiolata, ovato-lanceolata; plurima ovata, acuta; nonnulla oblonga, obtusa; integerrima, undulata, mitia, supra glabriuscula, subtus villosa, venosa; venis alternis, incurvis, ut plurimum bipollicaria, latitudine pollicari.

Petioli—1-2-lineares, semiteretes, suprà sulcati, basi incrassati, parum incurvi.

Pedunculi—ex axillis superioribus terminalesque, polystachyi, paniculati, nutantes, villosi.

Spicæ—flexibiles, 3-6-pollicares, multifloræ.

Flores—conferti, brevissimè pedicellati, erecti, bracteolâ subulatâ, flore duplò breviori, stipati.

Calyx—parvus, albido-cæruleus, deciduus, diphyllus: *foliolo supero* ovato, acuto, concavo-cymbæformi: *infero* breviori, semibifido: *laciniis* ovatis, acutis, concavo-cymbæformibus.

Corolla—papilionacea: *Vexillum* nullum, nisi carinæ apices parvi vices illius gerentes: *Alæ* duæ, subrotundo-obovatæ, planæ, cæruleæ, deciduæ.

Carina—compressa, concava, supernè ventricosa, alba, apice luteo, decidua: *Appendix* carinæ (aut staminum vagina) monophylla, subconvoluta, basi carinæ inserta, utrinque acumine brevi, palato villoso, pistillum amplexans, cum cæteris floris partibus decidens.

Filamenta—octo, carinæ apici inserta, subulata, villosa, quatuor ad singulum latus, alternis brevioribus. *Antheræ* erectæ, biloculares, apice veluti in duo labia dehiscentes.

Germen—ovatum, corpore glanduloso, versus foliolum calycis superius productiori, persistente cinctum. *Stylus* simplex, incurvus, infernè attenuatus. *Stigma* simplex, latiusculum, truncatum, compressum, utrinque denticulo acuto, altero reflexo.

Drupa—pendula, ovata, nitida, lævigata, succosa, parvi pisi magnitudine, monosperma.

Nux—osseo-coriacea, fulvescens, oblongo-ovata, subanceps, unilocularis, punctis excavatis inæqualibus rugosa. *Nucleus* ovatus, albus, cotyledone gemino.

Habitat—in Peruviæ Andium montibus ad Panatahuarum provinciam, versùs Pati, Sirabamba, Acomayo, Pillao, Panao, Chaclla; et in Tarmæ provincia prope Huassahuassi, Palca, Huayabal, Huychay, et Morocamcha.

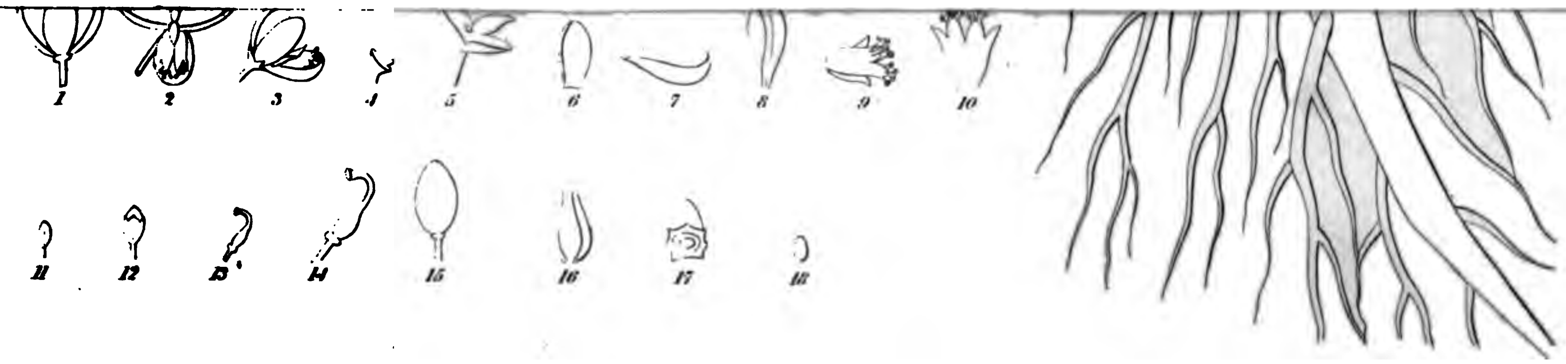
Floret—Augusto, Septembri, et Octobri.

Vernacule—in Huanuco, *Yallhoy*; in Pillao, *Masca*.

The Yallhoy grows on low peaks, and on the skirts of high ones, among small shrubs, bushes, and herbaceous plants, and is easily distinguished from all others by its beautiful spikes of blue flowers, variegated with white and yellow, and by its little fruits of a blueish purple, which when very ripe appear black. These spikes overtop many of the others considerably, waving and inclining toward the earth like a plume of feathers; and for this reason the plant is distinguished in Pillao by the name of *Masca*.

Those tracts of land, according to their greater or less elevation, are more or less fruitful, and consequently some are colder than others. In the cold tracts the plants are less villous, less branchy, and of smaller size than those which are found in lower, more sheltered, and temperate situations.

As such situations occur at the base of the Royal Mountains, or



MONNINA *polystachya.*

Weddell fecit.

the woody regions of the Andes of Peru, between the tropic of Cancer and the Equinoctial line, and from 9 to 11 degrees south, the vegetation of the Yallhoy is there perennial; for though the nights are considerably cold, it never snows or freezes in those places, nor does the mercury or spirit of wine in Reaumur's thermometer descend lower than five degrees above zero, and the greatest heat experienced at mid-day does not exceed twenty-four degrees of that thermometer.

There are frequent rains from October to May; but the plants obtain some sunshine, though for short and casual intervals, in almost all the cloudy and rainy days of the year.

EXPLANATION OF THE PLATE.

1. Flower with the carina erect, and the alæ open. 2. Flower with the alæ and carina expanded, shewing the stamens. 3. Lateral view of the flower. 4. Calyx. 5. Calyx magnified. 6. Petal seen on its interior face. 7. The carina declining. 8. The carina erect. 9. Appendix of the carina, with the stamens declined. 10. Appendix of the carina erect. 11. Stamen. 12. Stamen with the anther open. 13. Pistil. 14. Pistil magnified. 15. Drupe. 16. Nut. 17. Transverse section of the nut. 18. Kernel.

MEMOIR

ON THE

VIRTUES AND USES OF THE PLANT

CALLED IN PERU

THE STAR-REED;

(BEJUCO DE LA ESTRELLA.)

BY DON HIPPOLITO RUIZ,

FIRST BOTANIST TO HIS MAJESTY IN THE EXPEDITION TO PERU,
&c. &c. &c.

PRELIMINARY NOTICE.

As often as I have examined the Virginia Snake-roots brought to us from Virginia by the English for medicinal purposes, I have found them ill assorted, and mingled with different roots of other unknown plants, so intimately intermixed with the genuine ones, that the most acute and discriminating physician could scarcely distinguish them. I immediately conceived the idea of announcing this observation by means of the Memoir which I was about to publish on the Star-reed, to be presented to the Royal Medical Academy of Madrid, in order that, if approved, it might be inserted in the second volume of their Transactions.

The Royal Academy sanctioned it, and permitted its insertion in that volume, along with other Memoirs destined for the press; but the publication being unavoidably delayed, and the Academy being desirous that the Memorial should appear as early as possible, they proposed to me to publish it myself separately; which I now do for the benefit of mankind, and to supplant advantageously the highly lucrative branch of commerce carried on by the English in Virginian Snake-root to all parts of the world, by substituting the Star-reed, which not only admits of no similar admixture of other roots like that, but, being a species of the same genus, possesses the same virtues, and even in a stronger degree, and is besides susceptible of various other medical applications unknown in the Snake-root; besides which, the Star-reed is a drug of greater interest to Spain; because, growing abundantly in her American possessions, it will constitute, as already observed, a new and considerable branch of national commerce, if, according to reasonable expectation, the knowledge of its virtues and uses be diffused in Europe, and if that preference be given to it over the Virginian Snake-root which it deserves for the reasons above stated.

Note.—It would be of the greatest importance if Government would order the Viceroy of Peru to send supplies of the Star-reed, in order to contravene the exclusive trade of the English in Virginian Snake-root, or at least to save Spain the annual sum drawn from her by them for this article. Meantime the Virginian root might be tolerated, on condition of not admitting into our ports, and through the frontiers of Portugal or France, any supply of it without strict scrutiny that it be clear of other roots with which it is always found mixed; and that it be always of the pale straw colour natural to that which is in good condition; because it would be a less evil to be without Snake-root, than to administer it to the sick in a decayed state, or mixed perhaps with deleterious roots.

Among the multitude of vegetables which grow spontaneously and clothe on every hand the cascades, rivulets, banks, valleys, and high and low peaks of the extensive and rugged mountains of the Andes of Peru, not a few are found, which by their properties, virtues, and uses, merit a preference in the attention of naturalists, physicians, and merchants. One of these vegetables is the plant called in Pozuzo and other towns bordering on the frontiers of the native Indians, the Star-reed, or *Bejuco de la Estrella*; because its root and stalks, transversely cut, present on both sections many rays, diverging from the centre of the ligneous part to the circle formed by the bark, with which they represent a star, or rather wheel with many radii.

The natives of Pozuzo, Cuchero, Pueblo Nuevo, and Huanuco, give this plant the name also of *Contrayerva de Bejuco*; perhaps from its efficacy in those diseases in which the *Contrayerva* of the apothecaries, or the *Dorstenia Contrayerva* of Linnæus, is administered, or from some resemblance to the latter in the peculiar and grateful fragrance which it exhales. But this name of Contrayerva, applied by the natives to the Star-reed, ought not to be admitted in Materia Medica, it having been already applied to designate, as has been before shown, the root of a very different plant.

The independent Indians of Peru greatly value the root and stalks of the Star-reed, as a remedy for dysenteries, malignant inflammatory fevers, colds, rheumatic pains, and the various diseases arising from fatigue.

For each dose they take of the roots or fresh stalks a handful, large or small according to their size. This quantity they in-might use it instead of the *Aristolochia serpentaria*, especially against nervous, intermittent, and putrid fevers.

A short time after having remitted to Lima some stalks and roots to the celebrated Dr. Cosme Bueno, with a notice on the use made of them by the Indians, and on that to which this new medicine might be applied, I had the satisfaction to receive repeated thanks from him, with an intimation that the Star-reed operated with greater efficacy and certainty than the Virginian Snake-root.

From that period I diligently continued to make daily observations and experiments on the Star-reed; and having a few months before my departure from Peru for Spain, remarked that on being masticated it caused an abundant and viscous saliva, I inferred that it might be useful against tooth-ache, and advised several persons, frequently subject to that complaint, to make use of this new medicine. The patients in a few hours after taking a small piece into the mouth, and repeatedly emitting the saliva, actually experienced considerable relief, and, by continuing the use of it, were cured for the time of this disagreeable pain.

Well assured by repeated experiments of its odontalgic, antiseptic, and soothing properties, I transmitted to R. P. Francisco Gonzalez Laguna, a member of the religious order of the Agonizantes of Lima, and a commissioned correspondent of the Royal Botanic expedition, a packet of the Star-reed from the mountains of Pozuzo, in order that observations and experiments might be made upon it in the capital of Peru.

So many persons daily flocked to the cell of this friar, as soon as the remedy became known, that in a short time the packet of Star-reed was consumed, and the father requested of me another packet, that he might distribute gratuitously, as he had done the former, this new and efficacious medicine among the sick. On my departure from Lima for Spain this second supply had been already distributed:—a proof of its virtues as an odontalgic.

Lastly, I found that by frequently keeping a small piece of the bark of the Star-reed in the mouth, its pungency and fragrance prevented the perception of the bad smell and putrid miasmata peculiar to the breath and perspiration of some persons, and especially that odour which is perceived on entering hospitals and rooms of sick persons which are ill ventilated: therefore this plant deserves to be recorded as one of the best vegetable medicines against fœtid miasmata, and preferable to the roots of the *Iris Florentina, Ginger, Calamus aromaticus, Galanga*, &c. and as an efficacious remedy by which persons may correct or remove the smell of bad breath. The effects produced in Peru were experienced in Madrid by several who used the Star-reed for the tooth-ache, keeping in the mouth a small piece of the bark, in which, as is the case with many roots and stalks, the virtue resides; because in the ligneous part, where there are no manifest juices, the flavour peculiar to the bark is scarcely perceived, after the latter has been well separated from the former by pounding it in a mortar till it remains entirely clear from the ligneous part.

Some physicians of the court of Madrid, to whom the properties, virtues, and uses of the Star-reed in Peru were represented, have already begun to administer the powder of its bark in those cases in which that of the Virginian Snake-root is prescribed, substituting for half an ounce of the latter two drachms of the former with two ounces of bark for opiates; and they assert that the bark of the Star-reed takes effect more promptly and forcibly than the Snake-root.

The same gentlemen of the faculty have administered this new medicine in powder, without the addition of Peruvian bark or other medicines, the dose being from half a drachm to a drachm, and its effects have always answered expectation.

The Star-reed, like the Virginian Snake-root, belongs, as we have observed, to the genus *Aristolochia* of Linnæus; hence the resemblance of their properties and virtues cannot be doubted: but the Star-reed has the advantage of a more fragrant, grateful, and permanent odour, and of a more exquisite camphorous, balsamic, and bitter flavour than the Snake-root: it must therefore be more active in its effects, in all cases requiring the exhibition of Snake-root: consequently Star-reed is more estimable, and claims preference over the Snake-root in Materia Medica.

In addition to these solid reasons; there are others still more powerful, for substituting the use of the Star-reed for that of Snake-root.

1. Because the cuttings of the stalks and roots of the Star-reed, as gathered by the Indians, long, thick, and with strongly marked characters, admit of no mixture, nor can they be confounded with parts of other vegetables, as is the case with the Snake-root, which being very slender can readily be mingled with those of many other plants having roots equally slender, and similar in form and colour, though very different in their properties.

2. Because the thick bark peculiar to the stalks and roots of the Star-reed, is easily separated by twisting or breaking them from the woody part, which like that of the Snake-root is almost insipid and inert; and the whole bark may be reduced to powder alone, without any particle of the ligneous heart: this operation is impracticable with the small roots of the Snake-root,

by reason of their extreme tenuity; and for this reason they are always ground with the ligneous part.

3. Because in Spain we seldom obtain the Snake-root in good condition; it is commonly blackish, instead of a pale straw colour, full of earth and bits of the stalks, leaves, and unripe fruit of the plant; and, what is much worse, mingled with cuttings of forked stalks, which by their figure and articulations are indicated to be of a small species of *Euphorbia*, with numerous seeds, and other unknown substances, and a multitude of little roots of different plants, so intimately entangled with those of the Snake-root as to appear one and the same; from which circumstance it is difficult for physicians to distinguish the genuine from the spurious, even if they all, as it is to be hoped, attend to the selecting and cleansing of them; because they are commonly, when taken out of the cases or packages, broken, mixed with earth and dust, and almost always half decayed, or at least mostly deprived of that natural colour, flavour, and fragrance, perceptible in those which are well packed and carefully preserved.

4. Because merchants and druggists, who never attend as they ought to prevent their being damaged, to the cleansing of the simples which they dispose of, at an arbitrary and exorbitant profit, not only to apothecaries, but also to those who cannot discriminate, as they do, between the useful and beneficial and the useless and noxious, sell the Snake-root, as well as most other vegetable drugs, in a broken and almost pulverized state, and with little roots and filaments of other plants growing among them, together with other spurious substances; and in this condition the medicine is administered to the sick by persons ignorant of physic, not a few of whom often purchase from druggists with the prescriptions of medical men, not only it,

but the other simples in common use, as well as various other compounds and preparations either in larger or smaller quantities.

There is no other reason for these irregular sales and purchases, except that the articles are to be obtained cheaper from druggists than from apothecaries; the purchasers, and those who send them, not reflecting that such articles are not genuine, some of them ill assorted and in worse condition, others adulterated or of debased quality, as pulverized Peruvian bark, and that of the worst quality, the damaged and deteriorated, which as they cannot be sent in the natural state to the intelligent, are all pulverized; to those which have no astringency or good colour are added portions of the very bitter bark of Calisaya, and almost always bitter almonds, that they may not waste away in dust, and that the colour and flavour may be revived to suit the prejudice of the vulgar, who think that the bitterest bark is the most efficacious; an error indeed very difficult to eradicate from the ignorant multitude, as many persons endeavour to propagate it, for the purpose of vending the quantities of bark which unfortunately have been introduced among us by merchants, with the view of offering them cheaper than those of *Loxa fina*, *Peruviana legitima*, *Delgadilla*, *Anteada colorada*, and that of *Calisaya*, which have been hitherto acknowledged as the most efficacious in medicine.

Purchasers also find *extract of bark* to be cheaper with the druggists than with the apothecaries; but they are ignorant that it commonly contains one-third part of impurity, and is also burnt, and not of a proper consistency. Having all these defects, the current price of the Extract in commerce is three dollars a pound, and the merchants and druggists derive greater profit from this than from the well elaborated extract, which costs them eight or ten dollars a pound.

The druggists are also accustomed to sell the extract of opium mixed with a portion of gum arabic, which is added by those who work for the druggists, to augment its weight, and to give it even greater consistence and brilliancy than it ought to have, and hence arises the low price at which it is afforded by the druggist. Such an Extract cannot produce the effects which the Faculty expect, because neither they nor the purchasers from the druggists can know the relative quantities of opium and of gum in each portion of such a mixture.

Among the many articles which are usually bought from druggists by the unskilful, *Opium* is found without that indispensable purification which it requires when intended to be used internally, by means of which physicians separate the quantity which it contains of wax, sand, earth, leaves, seeds, and other impurities added by the Asiatic factors for the sake of gain. And, to conclude this digression, they also vend *Tartar emetic*, and other medicines, all prepared without careful attention, and without the relative quantities of each ingredient prescribed by the Pharmacopœias; and they are all dispatched empirically, without order, without method, and without the responsibility required from the apothecaries: from all which abuses there must necessarily result continual disappointments, which are sometimes attributed to the physicians, to the disparagement of their reputation and interests.

I have in almost every instance separated from two to five ounces of earth and other impurities from each pound of Virginian Snake-root. On the present occasion I separated from four pounds of Snake-root which I purchased, twelve ounces of earth and six ounces of various little roots, sticks, bits of straw, wool, down, moss, and numerous other spurious substances, which I give as evidence of the fact to this illustrious Academy.

I also separated from the same four pounds of Snake-root, six ounces of the root itself black and putrid, like that in the present sample, which cannot in any way be used internally.

The result of the examinations which I have repeatedly made is, that in the Virginian Snake-root, a fourth part commonly consists of impurities, and of some roots which, though very like the genuine ones, belong to different plants, as well as of other roots differing in thickness, shape, size, colour, and flavour, intimately interwoven with the others during their growth, the properties of which are with difficulty ascertainable, though each specimen be individually subjected to a deliberate examination and analysis.

For these reasons, in order to avoid the evil consequences resulting to mankind from the use of roots so ill assorted and conditioned, it has appeared to me highly important to present to this learned body a Memoir on the Star-reed, as preferable for medical use to the Virginian Snake-root, being a plant of the same genus, and more efficacious in its virtues, because it admits no mixture with others, either naturally or artificially, and because we possess it in South America in such abundance, that all Europe may be supplied with it, as soon as the commerce is established, and at a much lower price in our own colonies than we pay to the English for the Snake-root; in order that, if the Academy think fit, they may enjoin their members to examine and make the necessary experiments on this vegetable production; and the virtues of the Star-reed being ascertained by so illustrious a body, they may insert the Memorial in their Academical Transactions, and recommend its use in preference to that of the Virginian Snake-root.

The approbation of the Royal Academy, should this paper deserve it, will serve as a compensation for my labour, and as the greatest stimulus to my perseverance, with the same frankness I have hitherto used, and without availing myself of any reserves, as others have done to exalt unduly their meritorious secrets, in preparing and giving to the public dissertations on other new and valuable remedies; such as the Extract of Bark, made in Peru by the simple and exact method which I explained in my *Quinologia*, with the barks newly cut from the trees, the use of which, as well as of the bark, has been admirably diffused throughout Europe since the publication of that treatise; and they form at the present day two considerable branches of commerce, highly productive to the royal revenue and to Spain: the Root and Extract of the *Ratanhia*, a powerful styptic for restraining bloody fluxes in whatever way they originate, if the medicine be opportunely administered, and in proper doses;* to give firmness to the teeth, and to consolidate relaxations and fractures; through which efficacious virtues its use is extending in all parts, and forms another branch of commerce sufficiently important. The admirable remedy of the root of *Yallhoy* against dysentery, in which disorder it operates with singular energy, as has been proved by experiments in Peru, as well as in the general hospital of this city by an individual of this Academy, and at the Society's expense: The remedy of the *Calaguala*, under which name have been and are ignorantly sold various cryptogamous roots, species of the same genus, and others wholly different, as, for instance, the common *Calaguala* of commerce, which is almost insipid, and of little or no virtue: hence the use and virtue of the genuine and very bitter plant of Peru have been unjustly depreciated; and occasion has been given for various physicians to write both for and against its sudorific and solvent properties; that of the *China Peruviana*, with an infusion or decoction of which, taken abundantly for some days, the Indians and other tribes cure themselves of rheumatic pains, and obstinate inflammatory and herpetic affections; that of the *Canchalagua*, the infusion of which is frequently used for tempering, purifying, and attenuating the blood, for restoring the relaxed stomach to its tone, and for abating intermittent fevers; as a sudorific also it is of great use in pains in the side without fever; and finally the *Sarguzo*, a remedy against the scurvy.

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* I have observed, that through want of skill with some persons in making a decoction of the roots of the Ratanhia, by depriving the dose prescribed in my dissertation of its extractive part, the medicine has sometimes failed of producing its effect so promptly as might be wished. I have also observed, that some of the Faculty having prescribed the Extract of the Ratanhia in small quantities, and diluted in much water, it has not operated with the efficacy desired, especially in urgent cases; in which the dose of the Extract, well elaborated, must be one drachm, or the eighth of an ounce, repeated four or more times a day, or every hour, as practitioners administer this remedy either in powder infused or boiled in water, or in the form of pills, when the patient or his stomach cannot admit it in the other modes.

May the present paper be useful to mankind! for that is the reward to which I aspire.

Although, for the admission of the Star-reed into medical use, the single fact was sufficient, of its being, like the Virginian Snake-root, a species of the genus *Aristolochia* of Linnæus, and of possessing a fragrance and taste much surpassing those perceptible in the Snake-root; I have thought proper, for the greater satisfaction of physicians, to give some chemical experiments on the Star-reed, in order to exhibit its component parts, and the most important results for medical use, as follows:

Chemical Analysis of the

STAR-REED.

As no method has been hitherto devised for exactly and completely analysing vegetable substances, without exposing their constituent principles, during the manifestation, by fire or by fermentation, to various alterations, and consequently producing results and new combinations which did not previously exist in them, I have confined myself to the following operations on the Star-reed, because, for ascertaining the properties, virtues, and uses of this new species of *Aristolochia*, they appear to be adequate, and have the least tendency to the destruction or decomposition of their principles.

1. In an ounce of pure alcohol I infused for three days twelve grains of powders of the bark of Star-reed, agitating it repeatedly, in order that the liquor might more easily extract from the powders the substances soluble in it. The alcohol became in a short time tinged with a beautiful gold colour, without acquiring any perceptible smell or taste; but a little of it being diluted in distilled water, a milky mixture was produced, having the fragrance and bitter taste of the bark, and thus indicating that the bark contained much camphorous resino-balsamic and extractive substance. The alcohol dissolved six grains, and the other six of the residuum remained without odour and tasteless. I infused these for eight days in an ounce of distilled water; it assumed no tinge, but in a short time afterwards became light blue, and remained so for eight days without perceptible fragrance or taste; a certain proof that the alcohol had dissolved all the extractive, colouring, camphorous, and resino-balsamic part of

the powders, and that only a little viscosity had remained in the residuum, which imparted the light blue colour to the water. Three grains, however, of the residuum were dissolved in the water, and there remained insoluble in the two fluids three of the twelve grains of pulverized bark which I had originally infused.

2. I placed other twelve grains of the powders in a cold infusion in an ounce of distilled water for forty-eight hours; it was tinged of a dull yellow colour, and the liquor and residuum possessed the smell and taste of the bark, though in a less active degree than had been emitted from the diluted alcohol in the former operation. With carbonate of potash, the filtered infusion was raised to a clear gold colour, but less beautiful than the tincture in the alcohol. With sulphate of iron it immediately became turbid, and formed a greyish precipitate; thus manifesting that the bark contains, though in a very small quantity, gallic acid, or the astringent principle. The water dissolved five grains, and the seven grains of the residuum I infused in half an ounce of pure alcohol, which became immediately tinged, and in a few hours acquired a gold colour almost equal to that of the first infusion in alcohol: when diluted in distilled water, the mixture became turbid, as in the first experiment, presenting the fragrance and bitter taste of the bark. The alcohol dissolved four grains of camphorous, resinous, colouring and extractive substance; and there remained three grains of residuum from the twelve grains of bark infused. From these operations the result is, that in both fluids nine parts out of twelve are dissolved, and three remain insoluble.

3. In an ounce and a half of alcohol I infused for three days forty-eight grains of pulverized bark of the Star-reed, and the liquor acquired a reddish obscure tinge: when diluted in water,

the mixture became entirely milky, having the fragrance and very bitter flavour of the bark; an evident proof that the bark contains a considerable portion of resinous substance:—and conformably to the results of the anterior operations, it may be calculated that the bark of the Star-reed contains one-sixth part of a camphorous and resino-balsamic substance, and $\frac{5}{12}$ parts of extractive substance. This tincture, diluted in common water, produces a very bitter flavour, but not ungrateful or repugnant to the palate; and as soon as taken into the stomach it promotes transpiration, and excites eructations with very remarkable fragrance.

4. I infused twelve grains of these powders in an ounce of acetic acid or distilled vinegar: after some hours the liquor began to assume a very clear gold tinge, the fragrance was faint, and there was no bitter flavour perceptible. The acid dissolved one grain of the powders, the other eleven grains remaining insoluble. I infused a sixth part of the pulverized bark in six parts of acetic acid not distilled; and by means of distillation in a retort, after six days, a vinegar was obtained of very grateful fragrance, not at all resembling the vinegars of other vegetable substances.

5. For the space of forty hours I infused in twenty ounces of distilled water, half an ounce of pulverized bark of the Star-reed; I placed it for distillation in a glass retort, with a tubular receiver over a moderate fire. At the commencement of the distillation, I perceived that every time the stopper of the receiver was removed, there was a slight evolution of gas, accompanied by the fragrance of the bark; this fragrance increased as the distillation proceeded. Having distilled about seven ounces I suspended the operation, and when the vessels were cold transferred the distilled liquor to two phials, in which manipulation a certain white slender film, like cobweb, which floated on the

liquor, separated into white particles or flakes, such as are formed when camphor dissolved in the sun is poured upon water. In one of the phials which I kept closed and at rest for more than two months, the liquor remained clear, its fragrance unaltered, and the floating particles entire as on the day when the liquor was put into the phial. In the other, which I frequently unclosed and shook gently to observe the substance of the flakes and the fragrance, they both diminished gradually and slowly, the liquor still remaining clear, and only becoming rather turbid when the phial was gently shaken; but as soon as the larger flakes ascended to the surface of the water, and the smaller ones by their greater tenuity descended, the liquor again became clear. It is to be inferred from this result, that in the bark of the Star-reed there is a considerable portion of a concrete camphorous substance or essential oil, which floats on the surface of water, and which cannot be held in solution.

6. Having filtered the liquor remaining in the retort after the preceding operation, and evaporated it to the consistence of honey, I placed it in the sun under a glass, where it assumed the solid consistence of pure extract in small crystals of various facets, brilliant and transparent, much resembling in colour and consistence the resin of jalap, and having a bitter acrid taste with little fragrance. The quantity of very pure extract was forty-eight grains. In the residuum there remained a hundred and eight, so that in distillation the half ounce of the powders lost in weight a hundred and thirty-two grains. We must infer that a part of this quantity combined with the water, part floated in the form of a camphorous substance, and part was dissipated in gas. The remainder was without taste or smell, the colour of the powders having varied little, and become somewhat paler.

7. I infused half an ounce of the pulverized bark in thirty-two ounces of very hot water for the space of two hours; I then took off the liquor, which was well tinged, and put to the remaining powders the same quantity of boiling water for the same space of time, shaking it occasionally; and when it had settled, I separated the second infusion, which was much more slightly tinged than the former. On the residue I poured sixteen ounces of hot water, and though I shook it more frequently than the two preceding infusions, the water was not at all coloured. I filtered the three liquors when cold, and evaporated them to the consistency of honey, and afterwards in the sun under a glass, to a solid consistency. There resulted forty-three grains of pure dry extract, having all the characters of that produced by the sixth operation. The residue weighed two drachms and a half, having a slight bitter taste with very little smell. The original half ounce of powders lost sixty-five grains of its weight.

8. In twelve ounces of pure alcohol I infused for ten days in a glass vessel, two ounces of the pulverized bark, and on shaking it repeatedly a beautiful and rather lively reddish tint was produced, which after filtration was finely transparent, and of a much brighter colour than the tincture of amber. The residuum was clearer than the powders before infusion, with a bitter taste and very little smell. I infused this residuum in an equal quantity of alcohol, which assumed a pretty strong tinge; but when poured into water it did not become turbid, or manifest the slightest resinous or milky appearance, like that of the first infusion, a few drops of which immediately imparted this milkiness to an ounce of distilled water; a proof that the first alcohol dissolved all the resinous part, and the second was

tinctured with the colouring and extractive part which the former had not completely dissolved, being already well saturated.

9. I placed half an ounce of the powdered bark to burn in a crucible, and it yielded thirteen grains of greyish ashes well charged with potash, which immediately manifested itself by pouring to a grain of the ashes, diluted sulphuric acid; a considerable effervescence was produced each time that the operation was repeated. From half an ounce of the ligneous part of the Star-reed, also burnt in a crucible, there resulted nine grains of ashes less grey, but also charged with potash, perceptible by the effervescence produced by the same acid.

10. In order to ascertain the quantities of pyroligneous acid and empyreumatic oil contained in the bark of the Star-reed, I placed for distillation half an ounce of the powder in a small retort. There remained in the retort two drachms of carbon quite black; in the tubular receiver I found two scruples of empyreumatic oil, thick and of a black reddish colour; and a drachm of pyroligneous acid of a pale colour, inclining to that of honey. About the weight of a scruple escaped in the form of gas through the tube or the stopper of the receiver. Some drops of the pyroligneous acid being placed in half an ounce of blue tincture of flowers of mallows, the fluid immediately became red, as is the case with sulphuric acid; but the lively colour gradually faded into that of white wine. I repeated five times the addition of the tincture of mallows to the liquor which had lost its red colour, and each time it again became red, with the difference of altering and losing colour more readily on the second addition, and so progressively in the succeeding ones, and the liquor contained in the glass remained of a bay colour, each time becoming darker. In another glass I put an equal quantity of the same tincture of flowers of mallows, which having

become red by the addition of a few drops of pyroligneous acid, assumed a beautiful green, on the addition of carbonate of potash; but in a short time it lost this green colour, as the red had disappeared in the former operations, and subsided into the colour of mead or white wine.

From these chemical products it must be inferred that the virtues of the Star-reed reside in the extractive resinous and aromatico-camphorous properties; and from this conclusion it appears to me, that to make proper medical use of this new medicine, the following simple preparations or formulas will be sufficient for the present; meantime skillful physicians may adopt them, or others more appropriate.

FORMULAS;

OR

PHARMACEUTIC PREPARATIONS FOR THE USE OF THE STAR-REED.

Powders of the Star-reed.

Take any quantity of Star-reed, break it sufficiently to separate the bark from the woody part; this may be separated as useless in the present preparation, or may be laid aside for the purpose of preserving the little extract which it contains. Reduce the bark to a fine powder, and preserve it, in a glass vessel well stopped, for use when required.

The regular dose is from half a scruple to half a drachm, instead of a drachm and a half of pulverized Virginian Snake-root well assorted and conditioned, and it will produce better effects.

Infusion of the Star-reed.

Take of the Star-reed well bruised ·· ·· ·· half an ounce,
Common water, boiling ·· ·· ·· ·· ·· ·· ·· ·· twelve ounces:
Infuse in a vessel well-stopped for three hours, shaking it repeatedly. Strain it when cold through a linen cloth.

It will serve for two doses.

Decoction of the Star-reed.

Take of Star-reed well bruised ·· ·· ·· ·· half an ounce,
Common water ·· ·· ·· ·· ·· : ·· ·· ·· ·· eighteen ounces:
Place in a well-closed vessel, and boil gently for half an hour; take it from the fire, and when cold strain it through linen.

It will do for two doses.

Essential Water of Star-reed.

Take of Star-reed well bruised ·· ·· ·· ·· ·· ·· 4 ounces,
Common alcohol ·· ·· ·· ·· ·· ·· ·· ·· ·· ·· ·· ·· ·· ·· 6 ounces,
Common water ·· ·· ·· ·· ·· ·· ·· ·· ·· ·· ·· ·· ·· ·· 6 pints:
Infuse in a vessel for three days; distill to one half in a retort with a tubular receiver to give passage to the gases, and with a moderate fire. When cold, put the distilled liquor into a well-stopped flask, and reserve it for use.

This water is preferable to that of the simple camphorated *Melissa*, and to other palliative remedies usually administered against flatulency and hysterics, on account of the greater portion of camphorous substance which it holds in solution by means of the alcohol, which is wanting in *Melissa*, and also on account of the resino-balsamic substance with which it is impregnated, and which is likewise wanting in *Melissa*.

The dose is one ounce.

Extract of Star-reed.

Take Star-reed well bruised ·· ·· ·· ·· ·· ·· ·· 1 pound,
Common water, boiling ·· ·· ·· ·· ·· ·· ·· ·· ·· ·· ·· 8 pints:

Infuse for two hours in a suitable matrass or vessel, shaking it repeatedly. Leave it to settle, and when cold pour off the liquor: to the residuum add boiling water four pints.

Shake, and proceed altogether as before, and to the residuum add two pints of boiling water.

If the third quantity of water comes off tinctured, repeat the operation until the water is withdrawn without taste or colour.

Unite the liquors, and having filtered them through paper or sand, let them be evaporated until the extractive part acquires the consistency of honey; then transfer the extract to a dish, and the solar heat, or a stove, will reduce it to a solid consistency, which may be ascertained by pulverizing a little of it in a glass mortar, or rubbing it between the fingers. In this state it may be wrapped in paper and preserved for use.

The dose is from ten to eighteen grains.

It may be administered in pills, or dissolved in boiling water, as must be done with all vegetable extracts, that they may be well dissolved.

Essence or Tincture of Star-reed.

Take of the pulverized bark of Star-reed ·· ·· 2 ounces,
Pure alcohol ·· ·· ·· ·· ·· ·· ·· ·· ·· ·· ·· ·· ·· ·· ·· 17 ounces:

Infuse for eight days in a matrass, shaking it from time to time, that the whole tincture may be the more effectually extracted by the alcohol. Filter, and keep for use in a glass vessel well stopped.

This beautiful essence is a digestive and corroborant stomachic;

of admirable use against flatulency; it promotes digestion, and in general causes eructation for some time.

Put for each dose, in a tumbler of common water, from twelve to forty drops, as the case may require.

This medicine may be kept in store, for domestic use, instead of Carmelite Water, or other tinctures or elixirs.

Vinegar of the Star-reed.

Take of the Star-reed well bruised ·· ·· ·· ··	18 ounces,
Acetic acid or common vinegar, very strong ··	9 pints:

Infuse for four days in a glass flask, and distil in a retort with a tubular receiver, to two-thirds; keep it well stopped in glass vessels for use.

It is an excellent preservative against putrid miasmata, and by its fragrance neutralizes the bad smells of hospitals and rooms ill ventilated.

Compound Vinegar of Star-reed.

Take Star-reed well bruised ·· ·· ·· ·· ·· ·· ·· ·· ··	8 ounces,
Heads of lavender and thyme, each ·· ·· ·· ··	5 ounces,
Acetic acid ·· ·· ·· ·· ·· ·· ·· ·· ·· ·· ·· ·· ·· ·· ·· ·· ·· ··	9 pints:

Infuse for four days in a glass vessel with a tubular receiver, to two-thirds, and keep it in phials well stopped for use.

It answers the same purposes as the former, and when diluted in a sufficient quantity of common water, serves to refresh and wash the hands and face, especially in hot weather, and, on a journey, to remove from the skin the tan, caused by the air and sun.

Characters peculiar to the cuttings of the Stalks and Roots of the Star-reed when in good condition.

Length—As the Indians, in order to preserve the roots and the lower and useful part of the stalks of the Star-reed, are accustomed to cut them in pieces of various sizes without attending to any fixed standard, the length of the cuttings, varying from nine to eighteen inches, is no certain character: neither is the crookedness of some of them, since others are more or less straight.

Thickness—As there are stalks and roots from one to eight inches in circumference, the thickness is no exact criterion of distinction.

Surface—When the stalk and roots are well nourished, the surface is more or less smooth, and free from the scurf or fissures with which the stalk is covered when it has not attained its due maturity, and from the furrows and wrinkles that are formed after drying, when they have been untimely gathered. The bark within is full of wrinkles impressed on it by the layers of the ligneous heart. When the stalks are very old, they are covered with wrinkles and a shrivelled substance wholly useless.

Outside, or exterior colour—Ash grey and earthy, uniform throughout its length.

Interior colour—On the two ends or sections of each piece the bark is more or less of a whitish ash colour, and the heart of a pale straw colour; though the interior of the bark, throughout its length, is greyish brown inclining to purple, and the heart or ligneous part between livid and dark grey.

Consistence—very compact and solid in the bark, and spongy in the ligneous heart; from which the former separates easily on twisting the piece; and the heart remains twisted like a cord composed of a multitude of layers or longitudinal sections, inlaid circularly with each other, so that a transverse section presents the figure of a star, or a wheel of many radii.

Solidity—from one line to four in well seasoned barks; and in proportion as the bark is thick, compact, frangible, and separable from the ligneous body, in respect to the thickness of the cuttings will those cuttings be valuable, because in this case they have been gathered in the right season: but if the bark be thin, furry, wrinkled without, and not easily separable from the heart, the cuttings will have been from tender and unripe stalks, and for this reason there will not be the same fragrance and bitterness as in the others; and the virtue will be less efficacious. In the interstices of the layers of the heart, there is a substance of the nature of bark, though in small quantity, which is with difficulty disengaged on pounding the woody part well, but it remains almost wholly reduced to powder.

Cutting—The bark from its solidity cuts every where alike, without leaving rough edges or inequalities; the heart, being woody and laminous, cuts always unequally.

Weight—Well-grown and seasoned pieces are rather heavy in proportion to their thickness; on the contrary, the ill-seasoned are very light.

Juice—extractive, resinous, concrete, abundant throughout the bark, forming with it a solid paste with brilliant points, sufficiently distinguishable on examining the cutting with a solar or reflecting microscope.

Smell—very fragrant, grateful, camphorous, and balsamic, much more active than that of the Virginian Snake-root.

Taste—at first sweetish, but afterwards becoming very bitter, stimulant, clammy, aromatico-balsamic conformable to its delightful odour.

DESCRIPTIO BOTANICA.

CLASSIS XX.

GYNANDRIA HEXANDRIA.

ARISTOLOCHIA FRAGRANTISSIMA.

A. foliis cordatis acuminatis mitibus, caule fruticoso scandente, pedunculis 1-3nis unifloris brevibus. *Flor. Per. et Chil. edend.*

Planta—fruticosa, scandens.

Radix—fusiformis, perpendicularis, longissima, usque ad sex pollices crassitudine, infernè ramoso-fibrosa, cinereo-fusca. *Cortex* à linea ad quatuor lineas crassus. *Parenchyma* transverse sectum in stellæ formam radiatum, albidum, post exsiccationem fuscum, funiculiforme, in plurimas lamellas flexibiles longitudinaliter scissile.

Caules 3-6 ex radice, ad arborum summitates scandendo-assurgentes, aut procumbentes, valde diffusi, teretes, flexuosi, 3-8 pollices crassi, fusco-ferruginei; infernè magis minusve ramosi, nudi; supernè ramosi, striati. Cortex et Parenchyma, ut in radice.

Rami—longissimi, teretes, striati, pubescentes, mites, tandem lanuginosi.

Folia—alterna, remota, longe petiolata, deflexa, cordata, acumine longo acuto, integerrima, membranacea, venosissima; suprà glabra, asperiuscula; subtùs reticulata, pubescentia, mitia, aliquando subferruginea; 2-3-palmaria, latitudine sesquipalmari.

Petioli—foliis triplò breviores, teretes, striati, contorti, fusco-ferruginei.

Pedunculi—axillares, gemini, solitarii ternique, uniflori, teretes, petiolis quadruplo breviores.

Corolla—fusco-rosea, bipollicaris, intùs villosa, tubulosa: basi ventricosa, obtusè hexagona. *Tubus* teres, supernè sensim ampliatus. *Limbus* obliquus, lingulatus, apice reflexo.

Antheræ—luteæ, oblongæ.

Capsula—oblonga, obtuso-sexangularis.

Habitat—copiose in Peruviæ Andium nemoribus, ad Pozuzo, Monzon, Chicoplaya, Tulumayu, et Huallaha.

Floret—in Januario et Februario Limæ, quò à me translatæ et cultæ fuerunt nonnullæ plantæ juniores.

Vernaculè—*Bejuco de la Estrella* et *Contrayerba* de *Bejuco* audit.

Observ.—Indi Caules, qui funiculorum formam, si à cortice spoliantur, referunt, ad crassas restes conficiendas adhibent, et ex ipsis pontium funes construunt; quin etiam tuguriorum trabes totamque compagem vinciunt, firmantque cum prædictis caulibus, quos incolæ vernaculè *Bejucos* nuncupant, ubi ceteras quoque plantas scandentes, aut volubiles; quas tamen singulas aliquo semper appellativo nomine insigniunt.

DESCRIPTION.

CLASS XX.

GYNANDRIA HEXANDRIA.

ARISTOLOCHIA FRAGRANTISSIMA.

A. leaves cordate pointed smooth, stem shrubby scandent, peduncles 1-3 short 1-flowered. *Fl. Peruv. et Chil. edend.*

Plant—climbing, shrubby.

Root—fusiform, perpendicular, very long, about six inches thick, furnished at the base with branching fibres; of a grey ash colour.

Bark—firm, from one to four lines thick, the centre, when transversely cut, radiated, whitish, and, after drying, grey, and of the figure of a cord, splitting longitudinally into flexible lamellæ.

Stems—three to six from each root, climbing up trees, or, when wanting support, spreading along the ground, round, flexuose, from three to eight inches thick, grey or ferrugineous, naked, more or less fissured below; striated and branched above, with the heart and bark as in the root.

Branches—very long, round, striated, pubescent, and woolly at the extremities.

Leaves—alternate, remote, on long footstalks, deflexed, cordate, acuminate, smooth, thin, veined, naked above, roughish and reticulated beneath; soft and pubescent, sometimes ferrugineous; from two to three hands long, and one and a half broad.

Petioles—one-third the length of the leaves, thick, striated, twisted, of a brownish ferrugineous colour.

Peduncles—axillary in pairs, sometimes three, 1-flowered, round, one-fourth the length of the petioles.

Corolla—reddish brown, two inches long, downy within, tubular, ventricose at the base, and obtusely hexagonal; tube round, widening gradually above, limb or border oblique, tongue-shaped, apex reflexed.

Antheræ—long and yellow.

Capsule—oblong, obtusely six-sided.

Grows—spontaneously and abundantly in the Andes of Peru, in the woods of Pozuzo, Monzon, Chicoplaya, Tulumaya, and the banks of the famous river Huallaha.

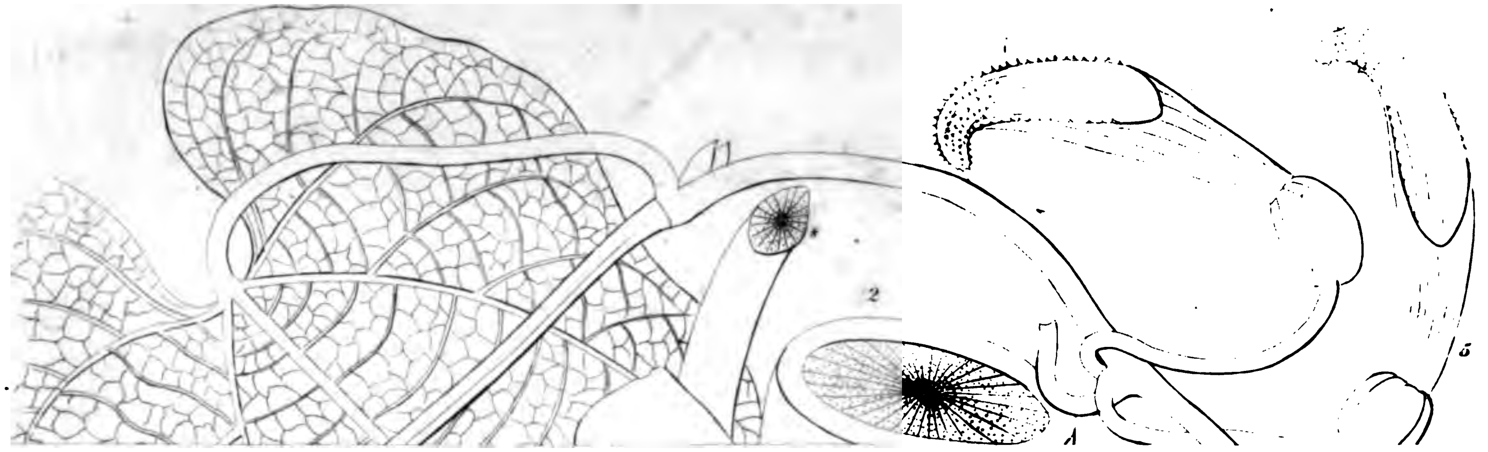
Flowers—in January and February at Lima, whither I transplanted and cultivated some young plants.

Vulgarly known in those mountains and at Lima by the name of *Star-reed* and *Contrayerva de Bejuco.*

Observ.—The stalks, resembling cords when stripped of the bark, are used by the Indians for making thick ropes, and for forming traces and hand-rails to bridges; they also tie and interlace the posts and beams of their dwellings with these stalks, called by those tribes *bejucos,* in common with every climbing or voluble plant, though they are each distinguished by some appellative name.

EXPLANATION OF THE PLATE.

1. Root. 2. Transverse section of the base of the stems. 3. Centre of the stem stripped of its bark. 4. Branch. 5. Flowers. 6. Flower longitudinally cut. 7. Stamens and pistil. 8. Capsule closed.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AN ACCOUNT OF

VALERIANA JATAMANSI,

THE SPIKENARD OF THE ANCIENTS.

IT has long been a desideratum among the moderns, to know to what order and genus the plant belongs, which produced the Spikenard of the ancients. We are indebted to that learned Orientalist, the late Sir William Jones, for having first pointed it out satisfactorily; although he confounded with it another species totally distinct; and from which he has taken his botanical description and figure. This mistake arose from his not having received perfect specimens himself; but trusting wholly to the account and drawing given him by a friend, who was entirely unversed in botany, and who therefore could not be well supposed to distinguish accurately two plants of the same genus. The *Jatamansi* or *Jatamangsi* belongs to the genus *Valeriana*, and resembles in several respects the Celtic Nard, *Valeriana Celtica* Linn. The plant is perennial and cæspitose. The roots are simple, perpendicular, from four to six inches long; the upper half is very thickly covered with the reticulated remains of past leaves, resembling the hair of an animal; the lower half is destitute of them, but is furnished with many short fibres which link them together. Their thickness varies: at the top they are generally that of one's finger, but taper gradually towards the base, and altogether resemble the tail of some animals. The radical leaves are long, lanceolate, acute, nerved, somewhat coriaceous, very entire, slightly pubescent, of a lively green colour. The stalks are solitary, arising from the centre of the leaves, varying from four to six inches in height, although they sometimes attain a foot; they are erect, very simple, cylindrical, furnished always, whatever their height may be, with two pair of leaves, pubescent, especially towards the top and leaves. Stem leaves opposite, sessile, of nearly the same shape as the radical ones, but much shorter, especially the uppermost pair; at the base they unite into a short sheath. The flowers are purple, collected into a crowded terminal cluster. The smell of the roots is peculiar to the genus, but more especially to *Valeriana Celtica* and *officinalis*; that of the *Jatamansi* may, however, be considered as possessing the most agreeable of any. This smell, which to many would not, perhaps, prove grateful, has led some to doubt its being the Spikenard of the ancients. My learned friend Dr. Francis Hamilton, in his account of Nepal, has expressed some doubts on the subject; but he says, "As there can be no disputing about taste, I cannot take upon myself to say how far the encomiums bestowed on the Spikenard are applicable to this Valerian; and the native women, no doubt, consider the smell very agreeable, because most of such as can afford it, use oil impregnated with this root for perfuming their hair. All I can say is, that, if this root was the Spikenard of the Roman ladies, their lovers must have had a very different taste from the youth of modern Europe." Notwithstanding the objections that might be raised against the *Jatamansi* on the ground that the perfume produced by its roots, would not prove, perhaps, so grateful to our modern ladies, yet to the ladies of ancient Rome it might have been highly grateful, as it is to those of Nepal at the present day. The late Sir William Jones, in two learned dissertations published in the second and fourth volumes of the Transactions of the Asiatic Society, of which he was the able president, has, indeed, so fully demonstrated, by so many proofs, that the *Valeriana Jatamansi* is identical with the Spikenard of the ancients, and this opinion is supported by so many concurring circumstances, that there can, I think, be no doubt now left on the subject.

The *Valeriana Hardwickii*, with which Sir William Jones confounded it, has short fleshy roots sending out numerous cylindrical fibres. The radical leaves are cordate on long petioles; those of the stem pinnate or ternate. The flowers panicled, triandrous. Filaments and throat of the corolla quite smooth. The stigma 3-lobed. In other respects it differs widely. The roots have a strong scent like those of the common Valerian, and, as we are informed by Dr. Wallich, in Roxburgh's *Flora Indica*, are used by the natives of Nepal for medical purposes. I have the satisfaction of presenting to the public a very accurate figure of the whole plant, taken from fine Nepalese specimens sent to me by my excellent friend Dr. Wallich, the worthy and indefatigable superintendant of the Calcutta Botanic Garden. I have, likewise, given in the plate a representation of the Spikenard root formerly sold in the London shops, which, after several years search, I was fortunate to meet with in the shop of the late Mr. Godfrey, chemist, in Southampton Street. It will be seen how exactly the two roots coincide. I shall now conclude this short account, by adding a very accurate description of the plant by Mr. David Don, from his manuscript *Prodromus Floræ Nepalensis*, in which he has described the greatest part of the Nepal plants sent to me by my friend Dr. Wallich.

TRIANDRIA MONOGYNIA.

Ord. Nat. *Valerianeæ*.

VALERIANA *De Cand.*

Valerianæ Species, *Linn.*

1. V. *Jatamansi*, floribus fasciculatis tetrandris, corollæ fauce barbatâ, ovariis tomentosis, stigmate simplici capitato, foliis lanceolatis acutis integerrimis pubescentibus; radicalibus petiolatis; caulinis sessilibus. *D. Don*, *Mss.*

V. *Jatamansi*, *Jones in Act. Soc. Asiat.* 2. *p.* 405, *et* 4. *p.* 109. *Roxb. ibid.* 451. V. *Spica*, *Vahl. Enum.* 1. *p.* 13, (exclus. descriptionibus omninò, quæ potiùs ad V. *Hardwickii* spectant.)

Habitat—in Bootaniæ et Nepaliæ Alpibus. ♃. (V. S.)

Planta perennis, *cæspitosa*—Radices fusiformes, longæ, crassitudine variantes, sæpiùs ferè digiti; parte superiore rudimentis retiformibus foliorum emarcidorum densissimè tectâ; inferiore fibris brevibus instructâ: figura omninò ad caudas aliquorum animalium spectans. *Caules* erecti, simplicissimi, cylindracei, fistulosi, pube brevi juxta folia et versus apicem densiore undique suppediti. *Folia* radicalia plerumque elongato-lanceolata, rarissimè ellip-

Valeriana Jatamansi.

tica, acuta, integerrima, coriacea, 5-6-nervia, basi in petiolum attenuata, utrinque sub oculis armatis leviter pubescentia; caulina sessilia, opposita: basi in vaginam brevissimam juncta; ima radicalibus conformia; suprema multò breviora sæpissimè ovata. ***Flores*** terminales, conglomerati, purpurei. ***Pedicelli*** ovariisque tomentosi. ***Dentes*** calycis brevissimi, triangulares, hirsuti. ***Corollæ*** tubo ampliato: limbo inæquali, 5-lobo: fauce villis clauso. ***Stamina*** 4, exserta; filamenta barbata. ***Stylus*** iis longior. ***Stigma*** simplex capitatum. ***Pappus*** brevis, facilè caducus. ***D. Don, Mss.***

EXPLANATION OF THE PLATE.

1. Whole plant, natural size.
2. A specimen of the Spikenard root formerly sold in the London shops.
3. Corolla magnified, shewing the stamens.
4. Calyx with the pistil; beneath are the bracteoid scales.

THE END.

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